VOL. XXVI. N°9. SEPTEMBER 1941

MECCANO MAGAZINE

GUNS!

6D.

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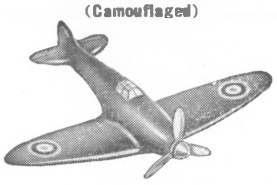

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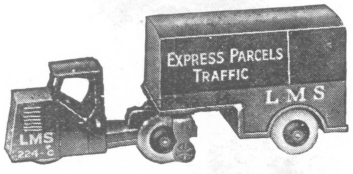

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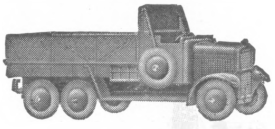

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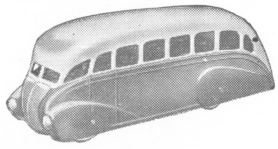

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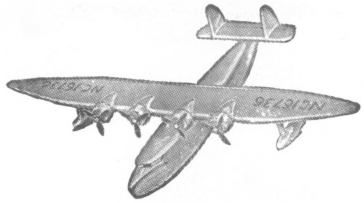

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Scale model of the Pan American Airways flying boat that took part in the trans-atlantic experimental flights in 1937.
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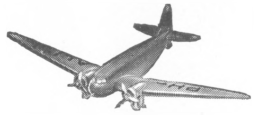

Dinky Toys No. 60t
Scale model of the Douglas DC-3 air liner, which is in regular service on many American routes.
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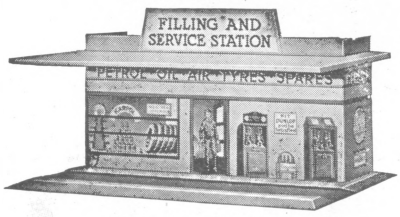

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Price **3d.** with Tax **4d.**
No. 47b (Three face)
Price **3d.** with Tax **4d.**
No. 47c (Two face) Right-angle or back-to-back.
Price **3d.** with Tax **4d.**

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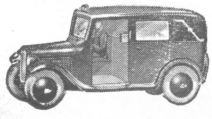

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Fitted with detachable rubber tyres.
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"THUNDERBOLT" SPEED CAR

Dinky Toys No. 23m

STREAMLINED RACING CAR

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Similar in type to the "Thunderbolt" speed car. Assorted colours.
Price **1/3½** with Tax **1/7**

A fine scale model of the car in which Capt. G. E. T. Eyston set up a world land speed record of 357·50 m.p.h. at Bonneville, Utah, U.S.A.
Price **1/5½** with Tax **1/9**

SPECIAL NOTICE

Will readers of the *"Meccano Magazine"* please note that, due to pressure of other work, we have been compelled temporarily to discontinue our Repairs Department, and no further work of this kind can be accepted.

When we are able to resume work in our Repairs Department we will at once make an announcement in the "M.M." and to our dealers.

MECCANO LIMITED

Next Month: "RAILWAY WORKING IN NEW ZEALAND." Publishing Date: 1st October

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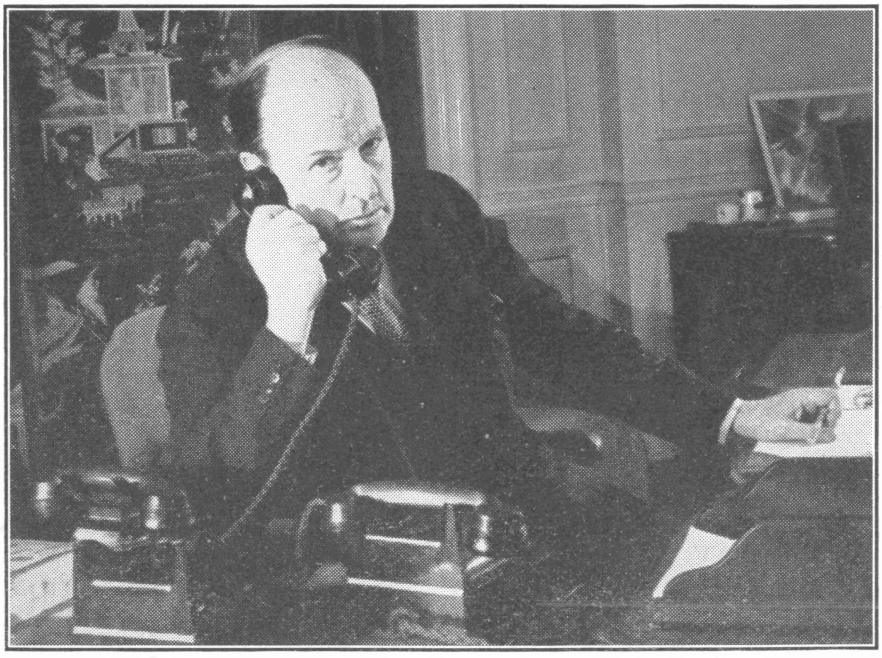
September 1941

With the Editor

The "Meccano Spitfire" Fund

In October 1940 a cheque for £2,000 was sent to Lord Beaverbrook, at that time Minister of Aircraft Production, as a first instalment from the "Meccano Spitfire" Fund. Readers will remember that in the December 1940 issue I published Lord Beaverbrook's letter of thanks.

Since that time the attractive little "Spitfire" Pendants have been in great demand. Large numbers of the standard type, available at 2/6 in eight different colours and in camouflage, have already been sold, and the chromium version at 10/- also has continued popular. In consequence the Fund has made steady progress, and in July last it was found possible to send to the Ministry of Aircraft Production a further contribution, of £1,500, making a total of £3,500.



Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P., Minister of Aircraft Production.

In response to this second instalment from the Fund the following message has been received from Lord Beaverbrook's successor, Lieut.-Col. J. T. C. Moore-Brabazon.

Ministry of Aircraft Production,
Millbank, S.W.1.
25th July, 1941.

"It is with great pleasure that I acknowledge receipt of the sum of £1,500 which you sent to me on the 18th July, as a second contribution towards the purchase of aircraft. It is a splendid effort and it is encouraging to learn that the fund is still going strong.

"Will you please convey to your directors and the readers of the Meccano Magazine my warm thanks and recognition of the spirit which prompted them to make this additional gift."

Yours sincerely,

J. T. C. Moore-Brabazon

Leaders in the War

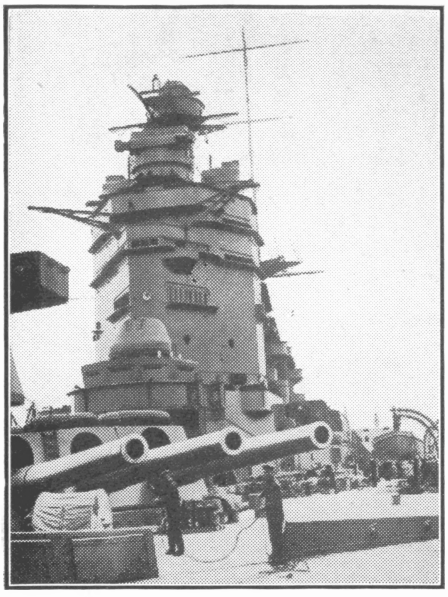
XXII.—Lieut.-Col. J. T. C. Moore-Brabazon

Lieut.-Col. J. T. C. Moore-Brabazon was born in 1884 and educated at Harrow and Trinity College, Cambridge. He was one of the first men in Britain to become interested in aviation and motoring. He built his first full-size aeroplane as early as 1907, and two years later achieved the distinction of being the first Englishman to make a sustained flight over this country. He holds the first pilot's certificate granted by the Royal Aero Club. In 1909 he won the prize of £1,000 offered by the *"Daily Mail"* for a flight over a circular course of one mile in an all-British aeroplane; his machine was a Short biplane. He became famous also as a racing motorist, and one of his early successes was achieved in 1907 when, on a Minerva car, he won the Circuit des Ardennes race, with an average speed of just over 60 m.p.h. for about 370 miles.

During the war of 1914-18 he was an officer in the Royal Flying Corps, and was responsible for its Photographic Section. After the war he was a member of the first Civil Aviatian Committee, and has been Chairman of the Royal Aero Club and President of the Royal Aeronautical Society.

Col. Moore-Brabazon became Minister of Transport in October 1940, and in May this year succeeded Lord Beaverbrook as Minister of Aircraft Production, a post for which he is splendidly fitted.

It is interesting to recall that just before the war Col. Moore-Brabazon sat on a model railway standards committee, the purpose of which was to give practical help to the model railway hobby and the important industry behind it.



H.M.S. "Rodney."

Naval Guns and Gunnery

By Captain Bernard Acworth, D.S.O., R.N.

THOUGH every destructive weapon that the fertile mind of man can devise is being used in this war of mechanisms, the naval gun remains supreme at sea.

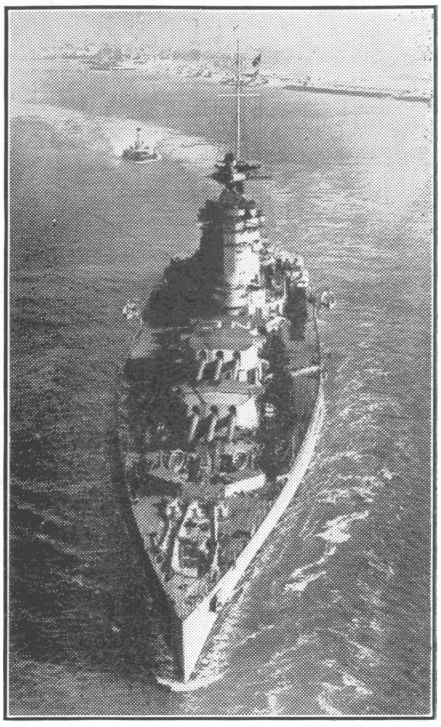
It is true that the heavy bomb, carried hundreds of miles in an aeroplane, and then dropped, is sometimes regarded as a longer-ranged and more destructive weapon than the projectile delivered only thousands of yards from a ship. But whereas the bomb's utmost striking velocity, starting at zero speed from a *vertical* range of 15,000 ft. or above, is limited by gravity and air resistance to 700 m.p.h., the striking velocity of a shell fired from a modern gun with a starting velocity of about 2,000 m.p.h., is, at a *horizontal* range of 15,000 ft., about 1,200 m.p.h.

But because at a height of 15,000 ft. and above the dropped bomb has an almost negligible chance of hitting a ship, dive-bombing has taken the place of horizontal bombing. Dive-bombing increases the chance of a hit, but it reduces the striking velocity of the bomb to little more than the dive-bomber's own speed of about 400 m.p.h., a speed that cannot penetrate armour, though the resulting explosion can, and does, accomplish damage against an armoured ship, and can sink frail and unprotected ships such as destroyers and merchant ships.

Furthermore, the gun can engage a target on any bearing; the fall of shot can be checked, and a miss can be used to adjust the sights till a hit is obtained, as will later be shown. To hit a target with a bomb, on the other hand, the aeroplane from which it is aimed and dropped must itself be at a single three-dimensional spot in space if a hit is to be obtained. A bomb-miss, therefore, cannot be used to correct the next "round," or salvo of rounds.

These comparisons between bombs dropped from aeroplanes and shells fired from guns are made to justify my claim that the gun remains the supreme weapon at sea.

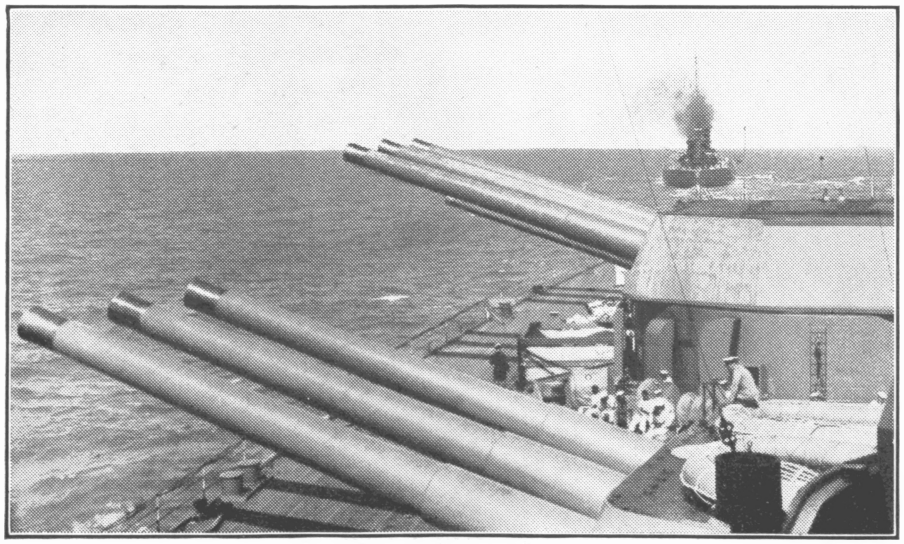
There are about eight different calibre guns now in use in the Navy, varying from the great 16 in. weapons in the *"Nelson"* and *"Rodney"* to the 4 in. guns used in the secondary armament of battle-cruisers, and in



H.M.S. "Nelson."

the main armament of earlier and small destroyers. The calibre of a gun is, of course, the diameter of the bore. The length of, say, a modern 16 in. gun of 45 calibres is therefore 60 ft., only two yards short of the length of a cricket pitch. The weight of one of the nine 16 in. guns mounted in H.M.S. *"Nelson"* or *"Rodney"* is 103 tons. The 640 lb. charge of cordite discharges the 2,461 lb. shell (well over a ton) at a "muzzle-velocity," as it is called, of 2,953 ft. per second. The "muzzle-energy" is little short of 100,000 foot tons, and with this initial energy and velocity the shell will perforate 59 in. of modern armour a few feet from the muzzle.

But while in flight through the air this initial velocity falls off rapidly, and thus the penetrative power. At about 22,000 yds. (about the range at which the *"Bismarck"* was first engaged by H.M.S. *"Rodney"*) it is probably about 18 in., though I cannot give the exact figure. The penetrative powers of armour by 8 in., 6 in. and 4 in. guns at 9,000 yds.—five land miles—are 4.4 in., 3.0 in. and 1.2 in. respectively. Fired at its maximum range of about 22 miles, a 16 in. shell travels to a height of over 30,000 ft.—about the

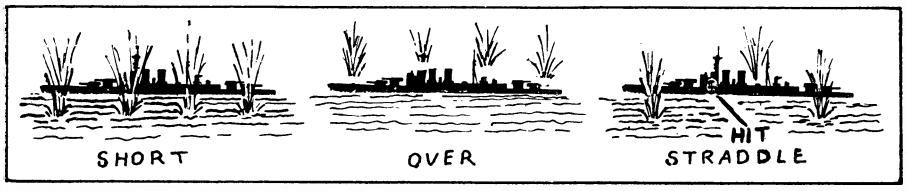


British warships on patrol.

height of Mount Everest.

The weight of the gun, charge and shell increases about as the cube of the calibre—twice the calibre being about eight times the weight. Thus the weight of an 8 in. gun, charge and shell, for example, are 18 tons, 98 lb. and 256 lb. respectively. For a 4 in. gun they are 2 tons, 6 lb. and 31 lb. respectively.

All the guns in the Navy, except the 15 in. and older 4 in., have a muzzle-velocity round about 3,000 ft. a second, which, as I have shown, equals a speed of about 2,000 m.p.h. These guns, unlike the older 15 in. guns which are "wire-wound," are constructed of solid steel tubes shrunk together. The old wire-wound 15 in. gun has a muzzle-velocity of only 2,450 ft. per second. The 108 miles of wire ribbon, as used in the old 12 in. gun, gave lightness and circumferential strength, but the wire-winding decreased what is called girder strength, thus involving "whipping" and loss of accuracy. It was for this reason that solid construction was introduced.

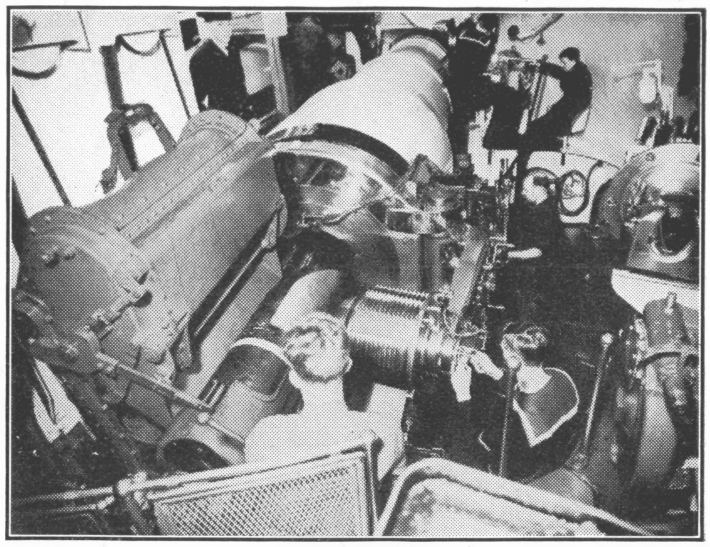


But in spite of this new tremendous muzzle-velocity of the latest guns, the remaining velocity and penetrative power of, say, a modern 8 in. gun at 9,000 yds. range is little more than that of an old 8 in. gun of two-thirds the weight using a charge of half the weight. The same is true of all other modern guns. The reason, of course, is the resistance of the air, which progressively reduces the speed of the shell.

Modern gun-actions at sea are generally fought at much greater ranges than 9,000 yds., so it will be seen how vast an effort has had to be expended in order to obtain only a slightly greater destructive power at long ranges. This phenomenon has its counterpart in the speed of ships, where enormous increases in horse-power are needed to increase speed by a few knots above the natural full speed of a ship of given length.

In the battle between armour and guns, armour therefore has the advantage, because only an inch or so of increased armour protection will counterbalance a great increase in the power of the gun, and muzzle-velocity of the shell.

In ships built before, and during, the last war the heavy guns were mounted in pairs, as shown in the 15 in. turrets on the cover of this number. The 6 in. and smaller guns were mounted singly, and were entirely hand-operated. The nine 16 in. guns of the *"Nelson"* and *"Rodney"* are mounted in three turrets, and the ten 14 in. guns of the "King George V" Class in two quadruple turrets and one twin turret. This method of grouping guns saves weight and space in the mountings.



In a gun turret of a British battleship.

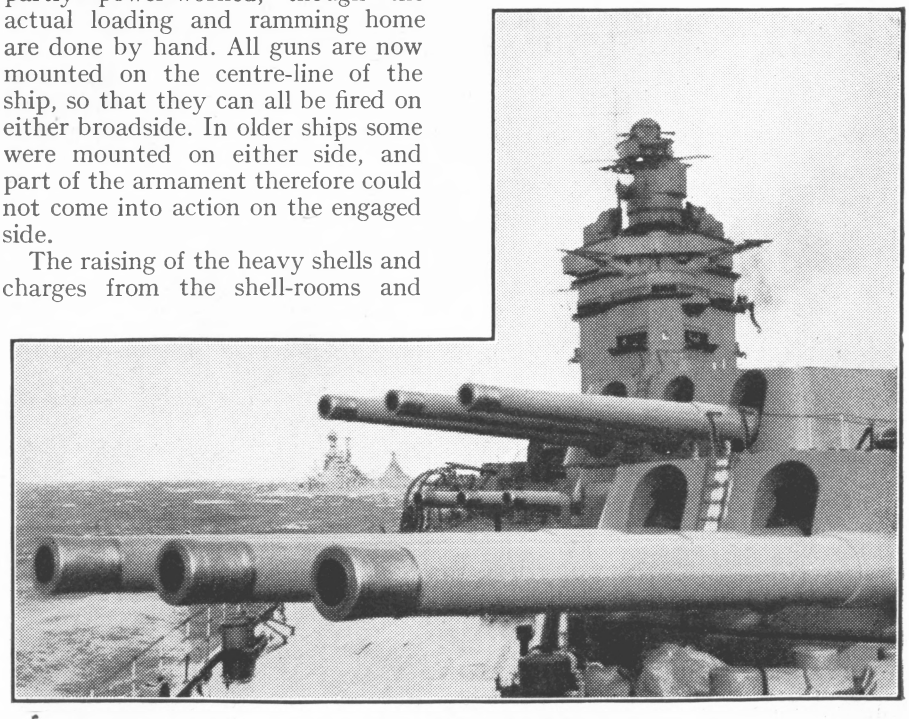
To-day the 6 in. guns of cruisers, and the 4.7 in. guns of destroyers, are mounted in triple turrets and are partly power-worked, though the actual loading and ramming home are done by hand. All guns are now mounted on the centre-line of the ship, so that they can all be fired on either broadside. In older ships some were mounted on either side, and part of the armament therefore could not come into action on the engaged side.

The raising of the heavy shells and charges from the shell-rooms and magazines, and the ramming-home and training and elevation of the guns, are all performed hydraulically. Only the firing of the guns is electric.

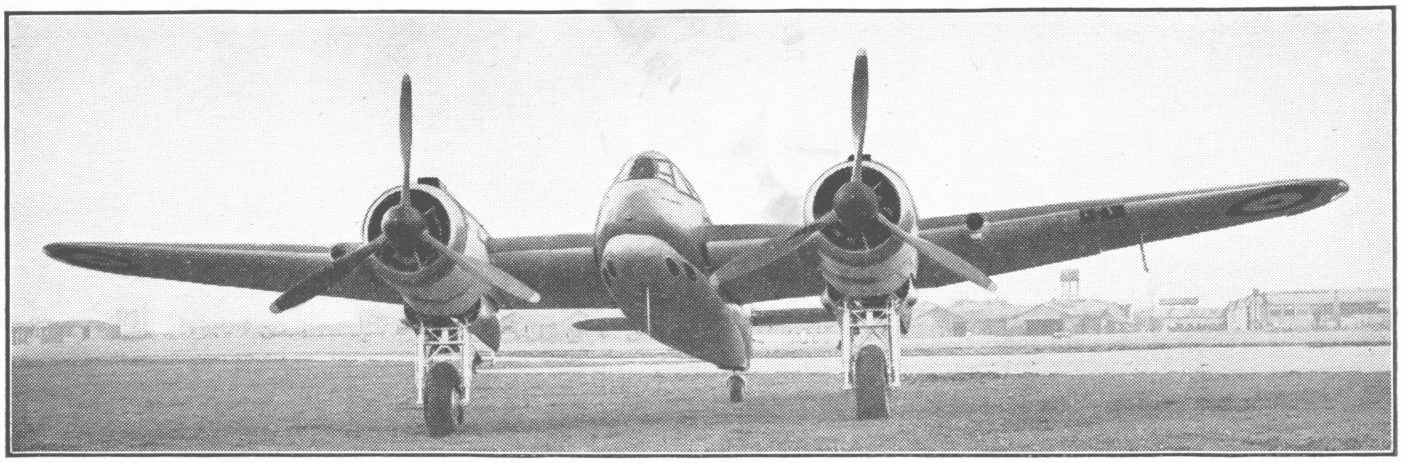
Having given an outline of some of the technical aspects of naval guns, I will conclude this brief account of a great subject by describing how the guns are brought into action when the enemy is sighted and engaged.

The procedure is the same for all classes of ships and guns, except in the case of action against aircraft where, against dive-bombers, independent firing has to be resorted to.

The whole armament is controlled by an instrument known as "the Director," situated (Continued on page 298)



H.M.S. "Rodney" shows her teeth.



The "Bristol" Beaufighter

A Twin-Engined Type of Outstanding Interest

THE "Bristol" Beaufighter is the latest of a famous line of "Bristol" designs. It combines tremendous fire power, long range, high speed and manœuvrability, and it is in service both as a day and a night fighter with the R.A.F. Already it has scored many successes by day and by night.

The Beaufighter is an all-metal mid-wing monoplane fitted with two "Bristol" Hercules engines. It is designed and equipped as a formidable long range fighter with exceptionally powerful armament and has accommodation for pilot and observer. The pilot sits in the nose and the gunner behind the wing. It is a big machine having a span of 57 ft. 10 in., a length of 41 ft. 4 in. and a height to the tip of the airscrews with tail wheel on the ground of 15 ft. 6 in. The track between main wheels is 18 ft. It is of all-metal stressed-skin construction with a monocoque fuselage, that is one in which the main stresses are taken by the skin.

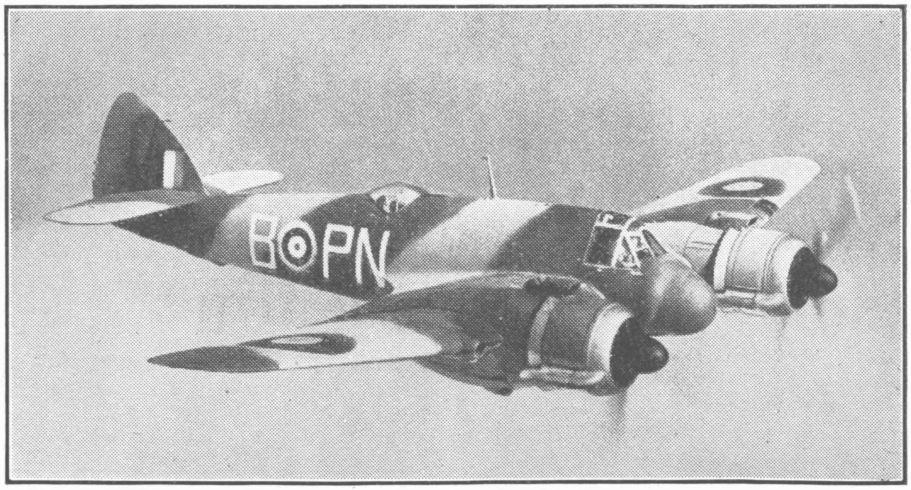
The main plane is a two-spar cantilever structure in three sections; the centre plane which passes through the fuselage and is bolted to it, and the port and starboard outer planes. The fin and tail plane are all-metal cantilever structures; and the control surfaces, rudder, elevator and ailerons are metal structures with fabric covering.

The two "Bristol" Hercules III engines are installed in nacelles near the outer ends of the centre plane. They are of the air-cooled sleeve-valve radial type, with 14 cylinders in two banks of seven each; and are fitted with two-speed superchargers and constant speed airscrews. They are fitted with long chord cowlings, the exhaust collector forming the leading edge, and controllable gills are fitted round the trailing edge which govern the air flow for cooling purposes. The fuel is carried in four self-sealing tanks, two in the centre plane and one in each of the outer planes. Separate oil tanks for each engine are mounted on the centre plane and an oil cooler is mounted in each outer plane, the cooling air being collected by a duct in the leading edge of the wings. Electrical starters and hand turning gear are provided.

Two special hatches in the underside of the fuselage are provided for access to the interior, one between the centre plane spars for the pilot, and the other for the observer further to the rear. These hatches swing down to open, and entrance is effected by the ladders attached to them. Hand grips and hand rails are also provided; they are opened from the inside by means of a lever.

The hatches are intended also for emergency exit by parachute. By a quick release each door opens so that part of the door protrudes outward into the airstream beneath the body. This creates a dead air region through which the crew can drop free without risk of injury, even in a dive up to 400 m.p.h. Additional emergency exits are provided, consisting of a knock-out panel on the starboard side of the pilot, a hinged window above the pilot, and a hinged hood above the observer.

The alighting gear consists of three retractable units, hydraulically operated. Two independent



The Beaufighter looks impressive in flight. This and the other illustrations are by courtesy of the Bristol Aeroplane Co. Ltd.

undercarriages are fitted under the engine nacelles at the outer ends of the centre plane, into which they retract rearward. The tail unit is also retractable forward into a recess in the fuselage. Electrical indicators and a buzzer in the pilot's cockpit indicate the position of the three units. Oleo pneumatic shock absorber legs are fitted, together with Dunlop pneumatically operated brakes. Automatic safety locks are provided on the undercarriages to prevent retraction when the aeroplane is on the ground.

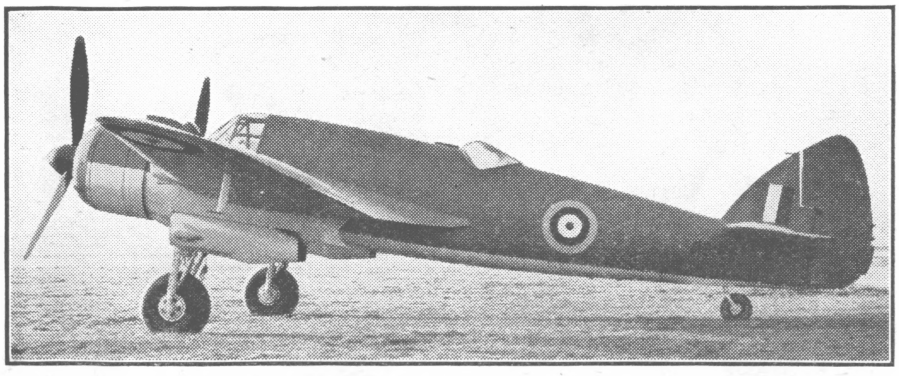
The flying controls are normal and orthodox in operation. The ailerons and elevators are operated by a spectacle-type hand-wheel at the top of the usual control column through chains and cables. Gunfiring controls and a brake-operating lever are fitted on the spectacle hand-wheel, the latter being fitted with a spring-loaded catch for applying the brakes for parking. The rudder is operated by pendulum type rudder pedals in parallel motion, the pedals being adjustable for leg reach. Locking gear for the flying controls is provided for parking the aircraft. Trimming tabs, controllable by the pilot, are set in the trailing edges of the rudder and elevators for directional and longitudinal trimming.

The hydraulic system operates the undercarriage and tail wheel retracting gear and the split trailing edge flaps. Pressure is supplied to the actuating jacks by two power-driven pumps, one on each engine. An emergency hydraulic system for lowering the alighting gear and flaps is provided and is operated by a hand pump.

The direction and turn indicators and the artificial horizon are operated by one of two vacuum pumps, which are fitted to each engine. In the event of the failure of one pump, the other can be selected by means of a change-over control on the port side of the instrument panel. The differentially operating brakes for landing wheels are also operated pneumatically.

Power for the electrical installation is derived from a 500 watt generator driven by the starboard engine, which provides current at 24 volts.

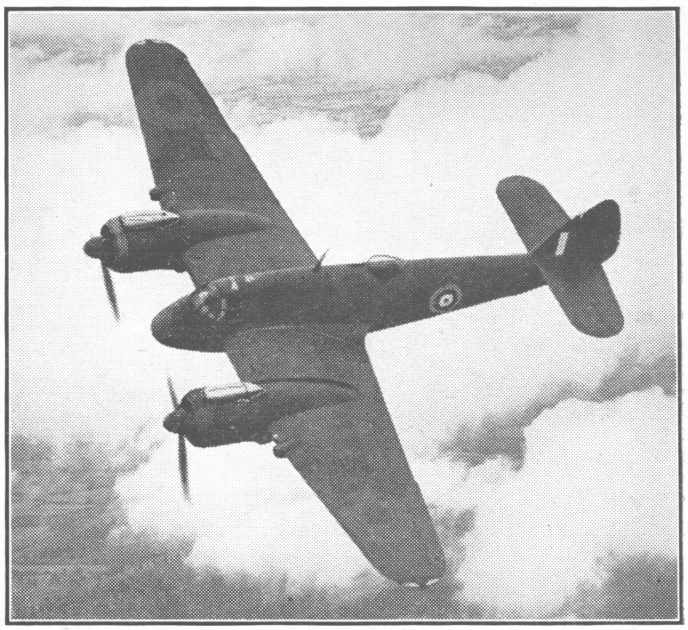
Intercommunication signalling between the pilot and the observer is provided by a buzzer and a white light on the observer's instrument panel in the rear fuselage, operated by a push button on the instrument panel. The observer can also operate a lamp on the instrument panel to attract the attention of the pilot. An emergency signalling system is also fitted; this is an entirely independent circuit used only when abandoning aircraft. A push button operated by the pilot warns the observer to prepare to abandon aircraft; and when the warning light on the instrument panel informs the pilot that the observer is ready, a separate switch is depressed, signalling to the observer to abandon aircraft.



This picture shows well the fuselage lines of the Beaufighter.

Now for a few interesting details of the Beaufighter. The two "Bristol" Hercules III aero engines develop 1,400 h.p. for take-off; 1,365/1,425 b.h.p. at 1,500 ft.; and 1,220/1,270 b.h.p. at 15,000 ft.

The capacity of the four fuel tanks is 550 gallons, made up as follows: Two centre plane fuel tanks, 188 gallons each; and two outer plane tanks, 87 gallons each. The two oil tanks contain 18 gallons each.



Manœuvrability is a strong point with the Beaufighter.

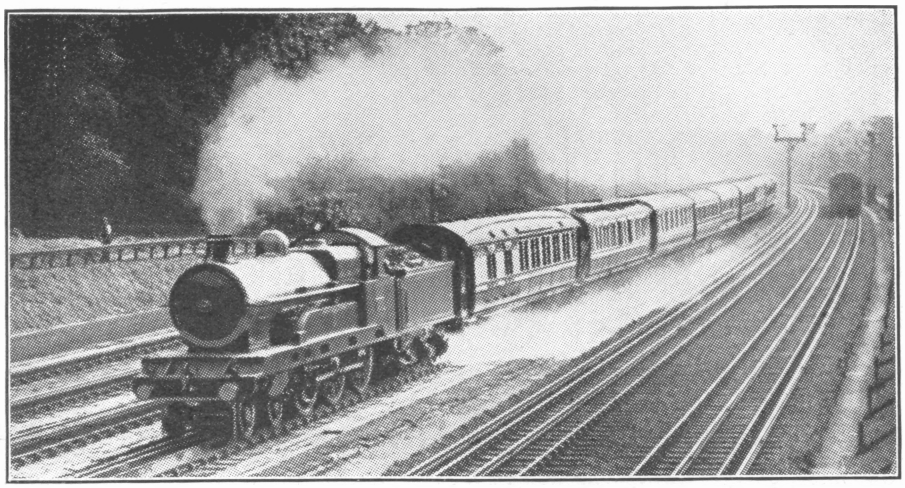
The Beaufighter has an all-up weight of 21,000 lb. and normally carries 550 gallons of fuel, weighing 3,960 lb. It has a nominal top speed of over 330 m.p.h. at 14,000 ft. and a disposable load, including fuel, oil, armament, etc. of 7,200 lb., which is 34 per cent. of the all-up weight. It has a nominal range of 1,500 miles. The initial rate of climb is 1,850 ft. per minute and the service ceiling just under 30,000 ft.

The armament of the Beaufighter is exceptionally heavy, including four 20 mm. cannons in the fuselage, and six machine guns in the wings. A four-gun turret can also be fitted in the top side of the fuselage just aft of the pilot's cockpit.

The night fighter version is finished in dull black and the day version in light blue and camouflage.

In the course of an account of a visit to one of the assembly plants at which Beaufighters are appearing at an impressive rate the "*Aeroplane*" says:

"Three night Beaufighters in their sombre, sinister black paint, relieved only by the identification circles and tail stripes, took off to show their paces before the visitors to the factory. The three Beaufighters flew past in Vee and line abreast formation and then split up individually in a fine Prince of Wales's feathers. They proceeded to behave like single-seat single-motor fighters rather than a two-motor type. The slow-rolls, stalled turns and almost endless climbs served to show both the sweet handling qualities and extraordinary power of the Beaufighter . . . Altogether the Beaufighter should prove an important contribution towards the gaining of air mastery. There is no other aeroplane in the world which combines the same qualities of fire power, speed, range and manœuvre and has so many applications in active service."



An Euston-Liverpool express passing over water troughs. The engine is one of the original "Claughtons" of the former London and North Western Railway.

RAILWAY NEWS

The Last of the "Claughtons"

The last two remaining "Claughtons" have been listed for withdrawal by the L.M.S. Both are rebuilds, and they are Nos. 5946 *"Duke of Connaught"* and 6017 *"Breadalbane."*

Once the pride of the former London and North Western Railway, the class when introduced in 1913 was decidedly the largest passenger type until then built at Crewe and it remained the principal express design until after grouping. The four cylinders were 16 in. diameter with a 26 in. stroke. They were placed in line and all drove the front coupled axle. The heating surfaces were as follows: Tubes, 1,574 sq. ft.; firebox, 174 sq. ft.; 24-element superheater, 379 sq. ft. Thus the total was 2,127 sq. ft. The grate area was 30½ sq. ft., the boiler pressure 175 lb. per sq. in. and the coupled wheels were 6 ft. 9 in. in diameter. The total weight of engine and tender in working order was 118 tons.

By 1921, 130 of these engines had been built. These were variously numbered and not all were named. Ross "pop" safety valves replaced the Ramsbottom ones on the later engines, while the cylinder diameter of all built after the first dozen, with the exception of four, was reduced to 15¾ in.; the exceptions had 15½ in. cylinders. Two sets of Walschaerts gear were provided, actuating the outside piston valves, the drive for the inside valves being connected therefrom by rocking shafts.

The "Claughtons" were so known because No. 2222, the first of the class, was named after Sir Gilbert Claughton, the Chairman of the Company. Their introduction enabled much double-heading to be avoided over the steeply-graded Preston-Carlisle line and other routes, and they proved capable of remarkably good work, although the boiler power was rather on the low side in relation to cylinder volume.

The L.M.S. classified the "Claughtons" "5P" and numbered them 5900-6029. Under their auspices 20 were rebuilt in 1928-9 with larger boilers, which gave them a powerful and imposing appearance. Of these 10 were provided with Caprotti valve gear with vertical poppet valves, instead of the standard Walschaerts valve gear and piston valves. The 20 rebuilds were classed "5XP" and worked through on the principal expresses between London and Holyhead or Liverpool, as well as on other long-distance services. The last unrebuilt "Claughton" was withdrawn in 1935 on account of the large number of "Royal Scot" and other modern and more powerful locomotives then available.

Locomotive News Items

Two new named "Hall" class mixed traffic 4–6–0 locomotives have been recently noted at work. They are No. 6914 *"Langton Hall"* and No. 6915 *"Mursley Hall."* It is understood that the popular practice of naming all the principal tender classes of engines on the G.W.R. has been temporarily discontinued as regards new construction. Nos. 6916-8 accordingly have appeared without nameplates.

We learn that L.M.S. 4–6–2T No. 6979 has been scrapped. She was the last of the once well-known express tank class introduced by Mr. Bowen Cooke for the former London and North Western Railway in 1910, further batches being added in later years. To begin with 10 were built to use saturated steam, and were provided with 18½ in. cylinders, 10 others being superheated and having 20 in. cylinders. The latter features afterwards became standard. These engines were familiar in the Central Wales, London, Liverpool and Manchester districts, and have been timed at speeds up to more than 70 m.p.h. They had Belpaire fire-boxes, 5 ft. 8½ in. driving wheels, boiler pressure of 175 lb. per sq. in. and a total heating surface of 1,333 sq. ft.

The new "V4" small 2–6–2 mixed traffic locomotive No. 3401 "Bantam Cock," which proved to be the late Sir Nigel Gresley's last design, has been on trial in the York and Edinburgh districts, and more recently in the Great Eastern area, working a considerable amount of express passenger traffic. No. 3402, the second engine, has been operating from Doncaster. All three classes of "Pacifics" are again handling loads up to 19 and 20 heavy corridor coaches, weighing, full, over 650 and up to nearly 700 tons, on the *"Flying Scotsman"* and other L.N.E.R. expresses.

Queensland's Record Railway Year

Queensland is one of the largest Australian states, with a population of nearly 1,000,000. About 6,600 miles of Government-owned railway are open for traffic, nearly all of the 3 ft. 6 in. gauge.

The Commissioners' annual report issued last year tells us that 5½ million tons of goods were carried, this figure, with the total gross earnings and the ton-miles run, constituting new records. Of the total passenger train mileage 35 per cent. was provided by railcars or by new Diesel 100-h.p. three-car sets known as "railcar trains," which operate to a large extent in country districts. Eight new locomotives were constructed in the Commissioners' own works and six more have been ordered from an Australian firm.

In Brisbane, the capital, a new Roma Street terminus has been completed, which handles long-distance passenger traffic. More facilities are now available in the old station, known as Central, for the busy suburban activities of the system. The layout did not allow of much opportunity for enlargement, but track improvements have been effected and automatic light signals installed.

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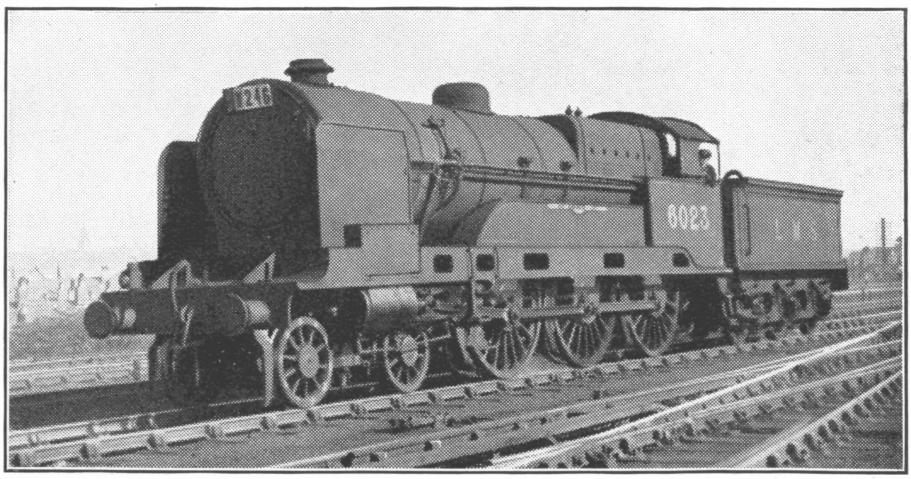
The distinction of being the world's greatest railway centre is claimed for Chicago, which is served by 20 main lines and 14 switching and terminal companies.



L.M.S. 4-6-0 No. 6023 "Sir Charles Cust," of the rebuilt "Claughton" class. The last two locomotives of this class are now listed for withdrawal.

L.M.S. West of England Wartime Running

A journey on the former Midland West of England main line from Bristol to Derby and beyond revealed some good locomotive work and efforts to regain lost time.

Northbound from Bristol the 3.5 p.m. to Sheffield was loaded to 360 tons full and hauled by Stanier 3-cylinder "5XP" 4–6–0 No. 5627 *"Sierra Leone."* The start is an extremely hard one. Up the 2 miles at 1 in 69-83-90 to Fishponds speed was sustained at 19-22 m.p.h., Mangotsfield stop being made in 14 min. for the 5 miles. A good run followed over easy grading to Gloucester. Reaching 52 m.p.h. along the first five level and slightly rising miles to Yate, the rate of travel touched a maximum of 68½ m.p.h. near Charfield. After maintaining an average of 60 m.p.h. on to Stonehouse, Standish Junction, 26 miles, was passed in 29 min. with time in hand to allow for a severe p.w. slack to 5 m.p.h., notwithstanding which Gloucester was reached slightly early, in 38½ min. nett for the 32 miles. The short start-to-stop stages on to Cheltenham and Ashchurch were hampered by engineering checks, and the departure from the latter junction was 11 min. late, so that there was an incentive for the good work that followed. Speed ranged from 53 m.p.h. up a 1 in 385-300 rise to 61½ m.p.h. on the level, the 24 miles to Bromsgrove taking only 29½ min. Banking assistance was now taken up the Lickey incline, and after signal slowings a stop was effected in Birmingham only 10 min. late although various delays totalled about 19¾ min.

A class "5" 4–6–0 mixed traffic locomotive working home was now attached in front, No. 5302, and with this galaxy of power when a clear road offered some fast acceleration and maxima were forthcoming, such as 66 m.p.h. at Kingsbury, 67 m.p.h. attained in less than 5 miles from a restart from Tamworth and 53½-55 m.p.h. beyond Derby, up the gradual rise between Ambergate and Stretton. A further 10 min. had been regained by the time Chesterfield was reached, and the actual arrival there was only 5 min. late. Mr. O. S. Nock, who timed this interesting run, observes that "We might well have been nearly half an hour late by that time but for the drivers' enterprising work."

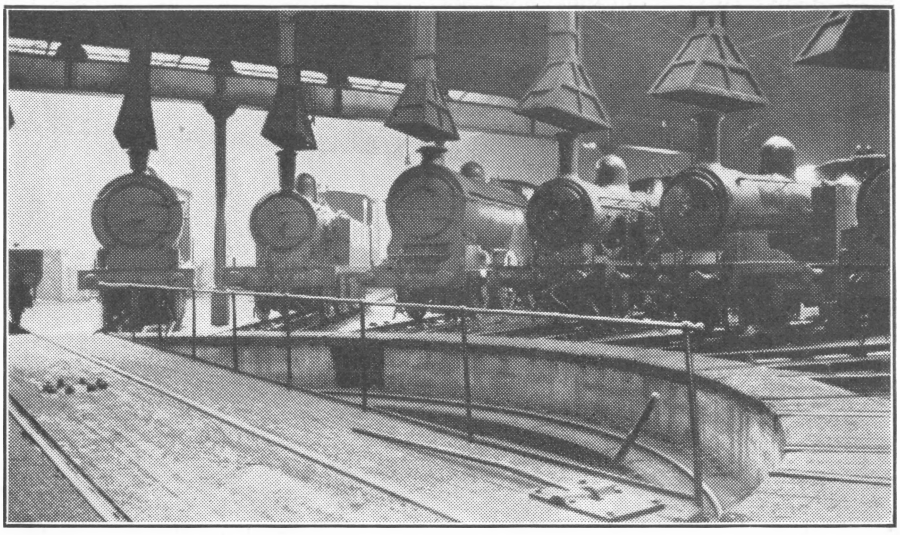
A Famous London Suburban Junction

Finsbury Park station on the former Great Northern Railway is one of the busiest L.N.E.R. London suburban junctions and one of the most important of its kind in the Metropolitan area. It was opened in 1861, when two bare wooden platforms provided the entire accommodation and the train service consisted of 15 stopping trains per day. The station was originally named Seven Sisters Road, after the thoroughfare on which it is situated, the present name being adopted in 1869 on the occasion of the acquisition of part of Hornsey Wood to serve as a public open space for ever under the title of Finsbury Park.

By 1909 over 500 passenger trains were passing through daily; there were eight platform faces and two busy underground electric railways terminated beneath the main station. Since then, an island platform has been added and another has been authorised in connection with electrification works. A feature of the intensive passenger traffic during suburban rush hours, when several trains proceeding in the same direction can be dealt with at once, is the good-humoured manner in which travellers change from one train to another within a matter of a few seconds by passing through the compartments of an intervening train standing on a dual platform line: that is to say on a track which has a platform on each side. There are several such arrangements of platforms at Finsbury Park.

* * * *

The watches of railwaymen in the United States must not vary more than 30 seconds a week from perfect time.



Engines in an old-fashioned locomotive running shed on the L.N.E.R. The tracks over the pits converged on to a central turntable, and the sheds were known as "roundhouses." The illustrations on this page are from photographs by O. S. Nock.

AUSTRALIA'S LARGEST LOCOMOTIVE

More details are now available of the new 4–8–4 express locomotive of the Victorian Railways. This is the largest passenger locomotive ever built or operated in Australia and has recently been completed in the Newport Workshops of the Victorian Railways, primarily for working the "Overland Express" to Adelaide over the Melbourne-Ararat section 131 miles in length.

No. 220 is of the "Pocono" type, "H" class. The boiler is the largest in Australia, carrying a pressure of 220 lb. per sq. in. and having a diameter of 6 ft. 9 in. to 7 ft. 3 in., and a length between tube plates of 20 ft. 11 in. The very large grate has an area of 68 sq. ft. The firebox is of the Belpaire type and includes a combustion chamber and two Nicholson thermic syphons. There are three cylinders, each 21½ in. in diameter with a 28 in. stroke. The valve gear is Walschaerts, placed outside the frames, actuating the outside cylinders through piston valves. The drive from these cylinders is on to the middle pair of wheels. The valves for the inside cylinder, which drives on to the leading coupled axle, is actuated by a conjugate gear connected to the outside motion. The engine has two domes and a double chimney in conjunction with twin blast pipes. One dome houses the regulator, the other a steam dryer.

The new locomotive was exhibited at Spencer St. Station, Melbourne, alongside No. 94, an old 0–6–0, built at Ballarat in 1884. There were 10,000 visitors, and the footplates were open to inspection.

The Ingliston Bank, the most formidable gradient on the route which No. 220 works over, is almost continuously inclined at 1 in 48 for nearly 10 miles, and the summit is some 1,500 ft. above sea level. It has recently been usual for two 4–6–0 class "XA" express engines to be used for heavy trains, but the aim of the designers of the new 4–8–4 design is to haul a 550-ton express up 1 in 48 at 20 m.p.h., which requires a sustained power output of a very high order. A mechanical stoker is fitted and the all-welded tender carried on two six-wheeled bogies has a capacity of 9 tons coal and 14,000 gals. water. The engine is built up on steel frames and has a "cowcatcher" in front, but no buffers.

A NOTABLE OUT-OF-GAUGE LOAD

The conveyance of a very large stator from an electrical works in the North of England to a power station in the south-east was successfully carried through recently by special freight train, which was worked in stages between Saturday night and Monday morning. So large was this piece of machinery that adjoining running lines were fouled, and it was therefore necessary to plan the running so that no trains would be passed other than at points where an alternative route or track was available. Notwithstanding wartime additional difficulties and pressure of other goods traffic, the whole movement was carried through without a hitch and with little interference with normal timings.

NEW LOCOMOTIVES FOR STEELWORKS

Three more standard gauge saddle tank engines having the 0–4–0 wheel arrangement and outside cylinders have recently been completed at the works of W. G. Bagnall Ltd. for heavy shunting duties on the private lines of the Guest, Keen, Baldwins Iron and Steel Co. Ltd. The wheel diameter is 3 ft. 9 in., the total heating surface 933 sq. ft., the boiler pressure 160 lb. per sq. in. and the tractive effort 20,962 lb. The equipment includes two water injectors, two Ross "pop" safety valves, Stephenson link motion and a 10-feed mechanical lubricator. The tank capacity is 1,000 galls. of water, there is a spacious coal bunker within the cab, and the total weight of the engines in working order is 43 tons 15 cwt.

A 4-4-2 tank engine of the former London and South Western Railway. The "O" in front of the original number shows that the engine is on the S.R. duplicate list.

Underwater Tunnel Built on Dry Land

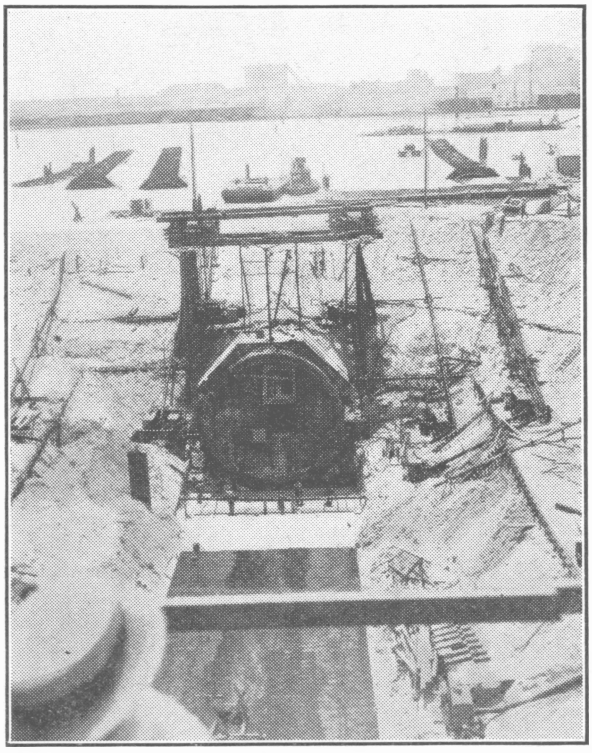
Tube Sections Sunk to River Bed

AN under-water tunnel for motor traffic has just been completed at the mouth of the Mobile River, Alabama, in the United States. It has been given the name Bankhead Tunnel, and it has cost about £1,000,000. There are many features of interest about it. Thus it has been built to form a new and valuable section of a great highway that has been famous for centuries. Further, it was not driven through the bed of the river, but was sunk in sections into a trench dredged out for it, and a remarkably simple system of ventilation was devised to get rid of poisonous exhaust fumes from motor vehicles.

The story of Mobile and of the road of which the tunnel forms part began about 400 years ago, when Hernando de Soto, a Spanish explorer, landed in Florida and thrust westward in search of gold. He spent his first winter in the country of the Appalachian Indians, on the northern shores of the Gulf of Mexico, and then advanced into the interior, where he met with strenuous resistance. He lost men in battle and by disease, but at length penetrated to the Mississippi River, where he died of fever while making his way down the River to its mouth.

The belief that riches awaited the explorer who followed de Soto's example inspired others to travel westward from Florida, and thus began the old Spanish trail. As the country developed under Spanish, French and American rule—the city of Mobile itself sprang into existence when the country was French—the trail became a highway and grew more and more important. To-day it is the busiest of all the highways of the southern states. It is carried across the head of Mobile Bay on a great causeway to Blakely Island, which is separated from Mobile by the river of that name. From the island a great detour was formerly necessary to reach the city, the road running about three miles northward to a lift bridge by which the mainland was reached, and then turning southward once more to pass through the centre of Mobile itself.

Altogether this troublesome detour was one of about 7½ miles. It might have been avoided by building a bridge from Blakely Island to the mainland. This would have been very expensive, however, for the structure would have had to be built high in order to allow the passage of ships underneath it, and as the surrounding country is flat this would have meant the construction of long elevated approaches. Instead therefore it was decided to take the highway under the river, and the Bankhead Tunnel was planned and constructed as a result.



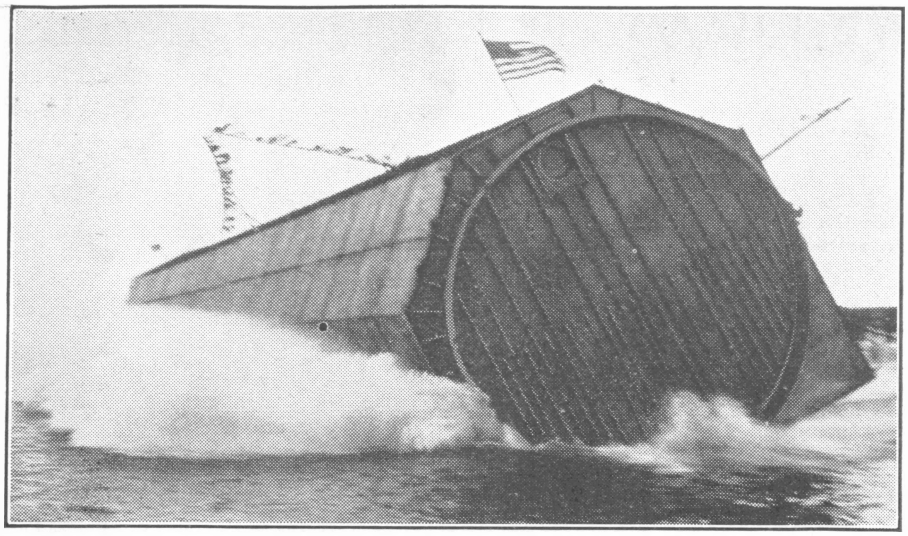
The first section of the Bankhead Tunnel being lowered into position. Other sections can be seen floating in the river. The illustrations to this article are reproduced by courtesy of Wilberding and Palmer, Inc., Washington and Mobile, consulting engineers for the tunnel.

Although the tunnel lies in the bed of the river, at a depth of 45 ft. below the surface of the water, it was actually built on dry land. The central portion consists of seven huge cylinders, which were launched after construction and floated into position to be sunk into a deep trench dredged for them in the bed of the river. Five of these sections are practically 100 yds. in length, and the others are only 15 yds. shorter, while all measure 34 ft. across. They are double walled, each having an inner tube of steel, 30 ft. in diameter, that is tied by a succession of steel ribs to an outer one, which is octagonal in cross section and has an average diameter of 34 ft. The space between the two tubes is filled with concrete, and there is a reinforced concrete lining 18 in. in thickness.

The actual building of the cylindrical sections was the part of the work that was carried out on dry land, and when this was completed the ends were closed by steel bulkheads and air was pumped into the tube at a pressure of 5 lb. per sq. in. This was done in order to test the joints, which were coated with soapy water so that tell-tale air-bubbles would reveal the escape of air. Only a few small leaks were discovered, and these were easily stopped.

Then followed the launching. As each of the giant cylinders was completed it was slid sideways into the river, as shown in one of the illustrations to this article. Then it was towed to dry dock, where it rested upright on supporting keel blocks while concrete was pumped into the lower portion of the space between the inner and outer tubes. This made it stable in the water and easier to handle while it was being towed to a slip half a mile away on Blakely Island. There a network of steel reinforcement was strung up on the walls of the inner tube and the concrete lining placed in position on it. In addition the 10 in. steel beams that were to carry the roadway were fitted across the inner tube and the reinforced concrete roadway itself was completed. More concrete was then poured into the space between the inner and outer tubes, leaving the upper portions to be filled later. All this concrete was pumped in from a floating plant anchored alongside, and the effect was to cause the cylinder to settle more deeply into the water.

In the meantime suction and bucket dredgers had been at work



Launching one of the seven tunnel sections, five of which were 100 yds. in length. The sections were sunk into a flooded trench dredged across the Mobile River.

digging out a trench across the bed of the river and through the ground on each bank. On the Mobile side of the river part of the work was done in a steel sheet cofferdam, which was excavated to a depth of 75 ft. at its lowest point. The greatest depth in the river channel was 81 ft.

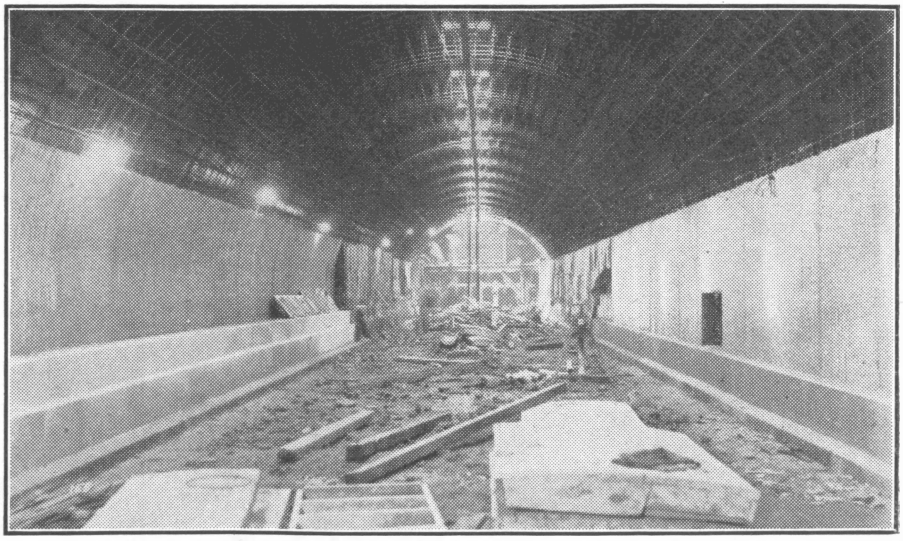
Each of the giant cylinders was brought in turn into place over the flooded trench, and more concrete was pumped into its crown to give it sufficient weight to carry it down to its final position. It was not allowed to fall directly, however. Instead each end was suspended by slings from a gallows frame erected above it, so that it could be lowered deliberately exactly where it was to go. The piles on which the frame was supported helped to stem the sweep of the tidal currents in the river, which otherwise might have tended to move the cylinder slightly to one side or the other. The final instalment of the concrete was poured in with the cylinder under water.

This work was begun in the trench on the Blakely Island side of the river, and section by section the tube was laid down until the Mobile shore was reached. The most accurate measurements were made to ensure that each was placed in its correct position, after which the tubes were drawn together by means of turnbuckles connected by divers to lugs built on to the cylinders for the purpose. Six turnbuckles were used in each case, and these were worked by the divers until a projecting collar round the end of one tube was pulled tightly against a gasket of heavy rubber and rubberised cord set in a circular recess in the end of the next. Later curved steel plates were slipped into recesses to form a cylinder round the joint, and the space enclosed by them was filled with concrete. This work was done from within the tubes, after the steel bulkheads closing their ends had been burned out with a torch. The last of the concrete was poured into the shell after it had been cast loose from the supporting gallows frame and it had settled into excavated material replaced in the trench. The weight of the tunnel caused it to sink in this to the required depth, and finally it was covered with sand up to the level of the bed of the river.

On the Mobile side the tunnel is continued by a steel tube of rectangular cross-section 452 ft. in length, which was built by the "cut and cover" method, in which a cutting was made and filled in after the steel tube had been built in it. This is followed by an open-cut ramp 280 ft. long. At the opposite end, on Blakely Island, there is another rectangular "cut and cover" section of steel 656.5 ft. in length. With the 2,000 ft. of underwater tube this makes up a total length of 3,388.5 ft. The central section has a very slight slope, and as the surface is approached at each end the gradient increases to a maximum of about 6 per cent., or 1 in 17.

The ventilation system of the Bankhead Tunnel is of special interest, for it differs from that employed in other great underwater tunnels. These have gigantic fans to force fresh air through sections of the underwater bore in sufficient quantity to remove the poisonous carbon monoxide that comes from the exhausts of motor vehicles. Experiments have shown that hot carbon monoxide when cooled tends to fall instead of rise. With this in mind air is drawn into the Bankhead Tunnel at its ends by suction fans housed in a ventilation building on Blakely Island. As this air flows in it cools the exhaust gases and encourages the desired settling towards vents placed in the lowest section of the tube, under the middle of the river. There are three suction fans, each driven by a 350 h.p. motor, and between them they are capable of exhausting 274,000 cu. ft. of air a minute. Normally only two will be kept in use, the third one being a reserve, and a carbon monoxide analyser brings them into action automatically as soon as the proportion of the gas rises above the safe limit of 4 parts in 10,000.

There are seasons when rainfall in Mobile and district is very heavy, and for this reason special arrangements have been (Continued on page 298)



Lining a tunnel section with concrete. The steel reinforcement can be seen in position in the upper part of the tube. On the left of the roadway is an elevated police walkway.

ENGINEERING NEWS

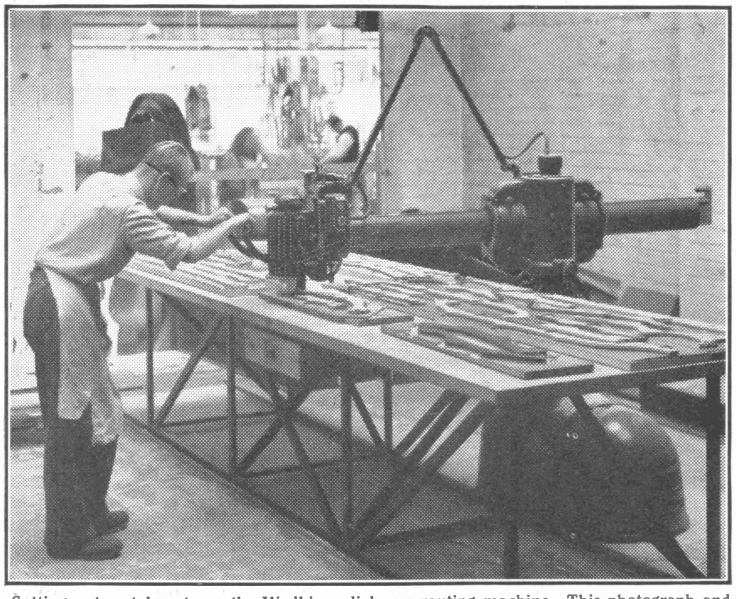
High Speed Production of Aircraft Parts

Many component parts used in the construction of aircraft are cut from large aluminium alloy sheets by high-speed machines known as routers. This method is considered the quickest and best for the production of parts of irregular shape, generally with large pieces cut out internally. A machine designed for this kind of work is the radial arm router shown in the illustration below.

The radial arm of this machine can be moved to cover any point within a circle 8 ft. 10 in. diameter, except within 19 in. of the main column. The table is a separate unit mounted on rollers and can be moved along the rollers to a second, or even a third position to allow larger sheets to be worked than can be covered by the radius of the arm. The cutter head is carried on an aluminium arm 5 ft. 10 in. long, which is mounted on ball bearings so that it has an easy backward and forward movement. The arm swivels through a full circle, and this movement is also on ball bearings to enable the operator to follow the outline of the pattern or jig easily. The router head embodies an electric motor with its armature mounted directly on the routing spindle. A cutting speed of 24,000 r.p.m. is obtained. The routing spindle has a vertical movement of 4 in., which is controlled by a double lever arm that is also used for manipulating the head when cutting. A plunger holds the head up when not cutting and a depth stop limits the fall of the cutterhead to the correct working depth.

In operation the head is manipulated so that a stationary guide bush follows the outline of the pattern or jig fixed to the table.

During the cutting operation the material and the pattern must be screwed down to the table, and it is found that this can usually be done through the drilling holes essential in the job and which are made before the sheets go to the router. In order to provide a means of drilling the large sheets, a separate radial arm drilling machine is available for use in conjunction with the router. In design it is substantially similar to the router, and will handle sheets of metal of similar size. It is provided with a high production drill head, a close-up of which is shown in the illustration at the top of this page.



Cutting out metal parts on the Wadkin radial arm routing machine. This photograph and that at the top of this page are reproduced by courtesy of Wadkin Ltd., Leicester.

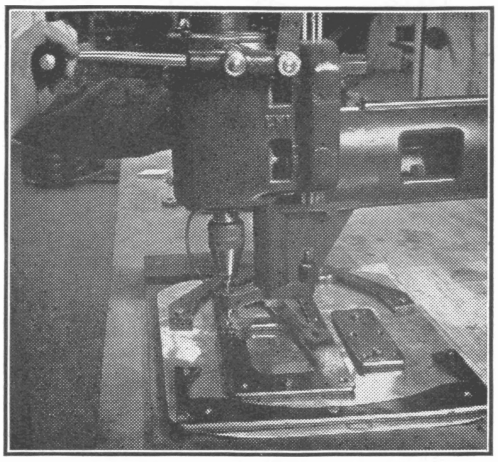
A Modern Sewage Disposal Plant

A large sewage disposal plant, which has been under construction for four years, has now been completed in Stockholm. The plant is situated on the outskirts of the town, and can deal with about 140,000 cub. m. of sewage a day. Nearly 100,000 cub. ft. of granite had to be blasted away to provide the site.

The sewage first passes through sand catchers and crushers, which remove the coarsest impurities. Then it flows into tanks where all fat is removed, and into four large settling tunnels, each about 65 ft. long, in which there are automatic scrapers for removing the sludge. The water is then further purified and treated with chloride of lime before it is allowed to pass out through the discharge tunnel. The sludge is transferred to digestion tanks on the top of a nearby hill, where it gradually produces methane gas, which is used for driving the city's public service buses and for operating the power plant. What remains at the sewage works after this decaying process is to be used as a fertiliser.

An interesting feature of the new plant is that all the pumps and other machinery are operated by remote control from central stations, only two men being necessary to control the operation of the entire works.

A fine laboratory completely equipped with modern apparatus is another feature of the works. This will be used chiefly for carrying out experiments in connection with the methane gas, but experiments will also be made in the manufacture of fertilisers and fat on a commercial scale.



The drill head of the Wadkin radial arm drilling machine.

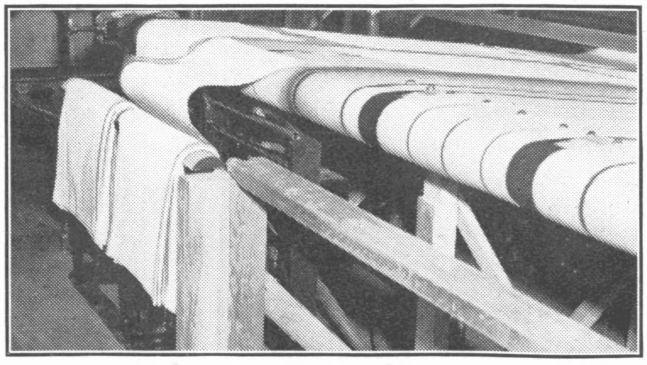
Another Giant Dam on the Colorado

It is proposed to build still another great dam across the Colorado River, about 67 miles downstream from the famous Boulder Dam. The new structure is intended to serve as a multi-purpose power and irrigation dam, and to meet growing population needs and national defence requirements in the region. The estimated cost of the structure is 41,200,000 dollars, or about £10,000,000, and it is designed for a power capacity of 225,000 kW.

A Novel Stacking Device

A unique automatic device for stacking pillow cases and similar articles as they leave the conveyors is being used in the Danvers Bleachery at Peabody, Massachusetts. This device, which is known as a "photo-electric automatic air doffer," is shown in operation in the illustration at the foot of this page.

The pillow cases come through a large ironing machine on to a conveyor belt, on which they are spaced about eight inches apart. As each travels along, its leading edge interrupts a light beam focussed on a photo-electric cell and so resets the mechanism for an operation. When the pillow case passes beyond the light beam, and light again falls on the cell, a valve is opened for a period of approximately a third of a second. This allows air at a pressure of approximately 15 lb. per sq. in. to enter two horizontal perforated tubes, one of which blows air against the leading edge of the pillow case while the second blows air towards the lagging edge of the case. The effect is to float the article on to a horizontal bar that serves as the receiving rack.



An automatic stacker for pillow cases that is controlled by photo-electric cells. Photograph by courtesy of the General Electric Company of New York.

PHOTOGRAPHY

Making Prints on Gaslight Paper

By John J. Curtis

IT has been said that the amateur photographer need never be miserable or lacking something to do, and we ought to be thankful for such a hobby these days. This blackout business has given every one of us a dark room. We do not have to shut out the light; it has already been done to satisfy the authorities. So we are actually in the delightful position of being able to go into any room in the house at night and do a spot of printing or picture making. This of course must not be taken too literally, for there are certain rooms in which the presence of the photographic enthusiast would be likely to cause severe domestic trouble!

Readers who have never so far attempted to make their own gaslight prints should start now, for apart from the simplicity of the work there is an extraordinary fascination about it, not only to the person doing it, but to all who can be persuaded to watch the effects of a chemical solution poured over a piece of prepared paper. The first outlay is not heavy. The only things that are really necessary are two dishes, one for developing and the other for fixing, a printing frame, a supply of the necessary chemicals for developing and fixing, and of course a packet of the gaslight paper itself. As far as chemicals are concerned readers are strongly advised to try one of the special sets produced by Johnson and Sons Ltd., and advertised in the *"Meccano Magazine."* In regard to the gaslight paper, this may be either glossy or mat according to taste, the former being more generally suitable for very small prints. It is also a great advantage to have a packet of medium grade paper for average negatives and one of contrasty paper for very weak negatives. One other thing is needed, a good-sized dish to hold water for immersing the prints between development and fixing, and for washing the fixed prints. Gaslight printing is so simple that if the instructions contained in each packet of paper are followed there should be no trouble. At the same time the following tips will be helpful and will reduce the risk of failures.

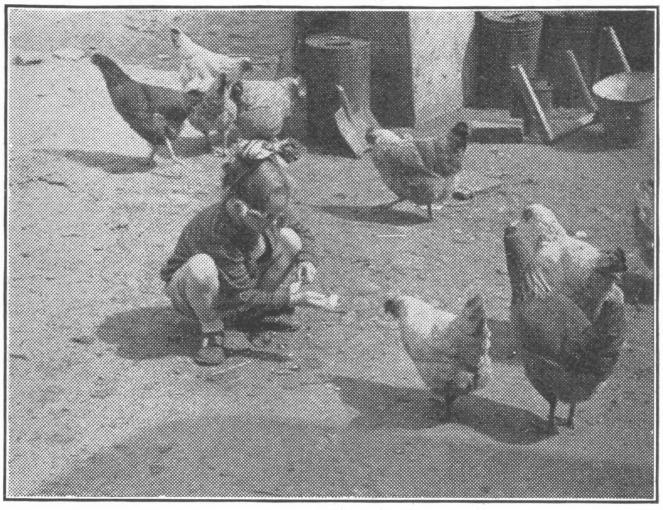
Before commencing printing operations go through all the negatives with which you propose to deal, and sort them into three groups, thin, medium and dense. The best method of telling the grade is to place a sheet of white paper on the table where you can make sure of a good reflected white light, and hold each negative against this. You will immediately realise what is meant by a thick or dense negative for you will find that it is difficult to see through it; with a thin grade on the other hand you get a clear definition of the whole of the image. In between these extremes come the medium negatives which, if exposures have been reasonably correct, should include the majority. As a matter of fact negatives rather on the thin side are specially good for gaslight printing; very dense negatives are difficult to deal with by this process and usually give better results with bromide paper. We hope to deal with this paper in a later article.

Any ordinary 40 watt lamp will do for exposing the paper, but if at all possible the lamp should be arranged at table level. Then the printing frame should be stood up facing it at a distance of about one foot. If you are taking up gaslight printing for the first time, a test exposure should be made with a medium negative. By means of a strip of cardboard give part of the negative an exposure of three sec., another part six sec., another 9, and a fourth part 12 seconds. When this trial print is developed it will be easy to see which exposure gives the best result, and so an average working time is obtained.

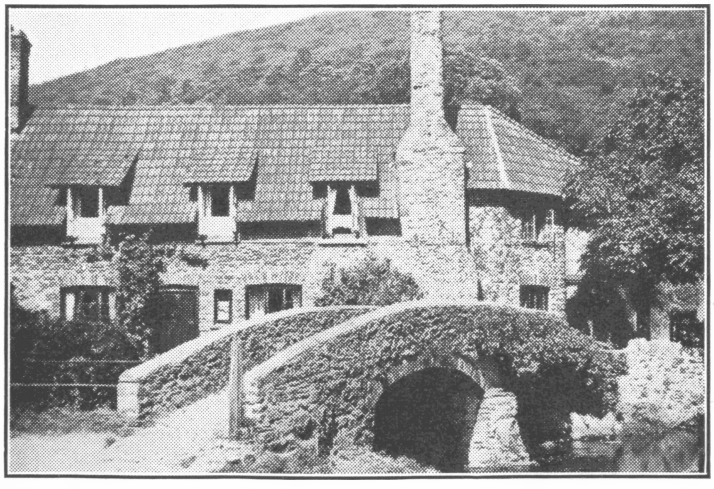
A light that is strong enough for printing purposes is of course strong enough to fog the paper. Fortunately gaslight paper is very long-suffering in this respect, and for taking paper from the packet and placing it in the printing frame, and for developing, the shadow of one's own body at a distance of a few feet from the light is sufficient for safety. If the exposing light is high up, however, so that the whole room is brightly illuminated, it may be necessary to provide some kind of screen.

When you put the negative in the frame lay it on the glass dull side, that is emulsion side, uppermost, and the paper on this with its emulsion side down. With glossy paper it is easy to tell the emulsion side, but with all kinds of paper the sheet tends to curl inward towards this side. After exposure place the paper emulsion side up in the developing dish and pour the developer over it with a gentle continuous movement. Rock the dish and watch for the image, and when this has reached the correct strength remove the paper, swish it quickly through the dish of water, and place it in the fixing solution, making sure that it goes right under the liquid. If the picture flashes up in the developer, exposure has been too long; if it is very slow in appearing, the exposure has been too short, and any attempt to correct matters by prolonging development will only produce stains.

When fixing is complete it only remains to wash the prints, and the best way of doing this is to give them a series of five-minute soakings, draining the prints and changing the water after each soaking.



"Making friends"—a charming photograph by R. J. Taylor, Bradford.



This ancient bridge with a background of old-world cottages makes a pleasing picture. It is the work of P. Seron, Kingston-on-Thames.

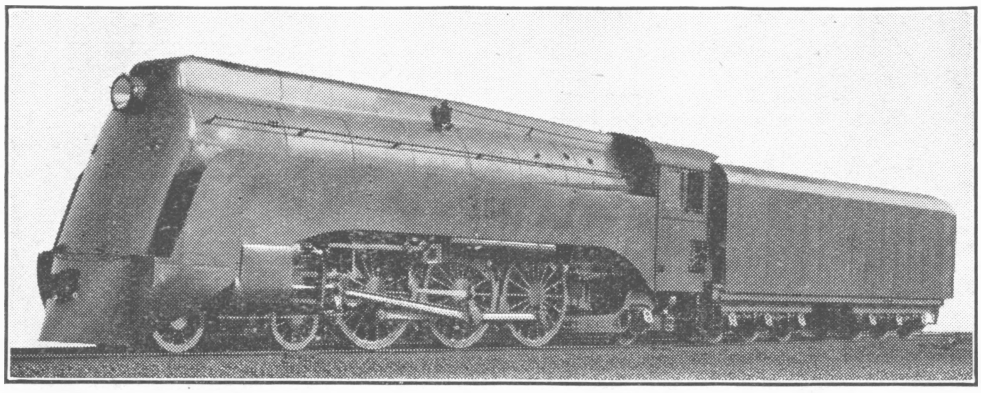
THIS MONTH'S COVER

For the fine photograph of a warship's guns on which this month's cover is based, we are indebted to Ilford Limited. The negative, which is made available by courtesy of Mr. Chas. E. Brown, was taken on an Ilford H.P.2. Plate.

Railway Working in Australia—II

By "A Railway Engineer"

FROM the first instalment of this article readers will remember that the main railways of Victoria and South Australia are laid on the 5 ft. 3 in. gauge; the two systems do indeed work in close co-operation generally, and may be considered at the same time. In these two States are to be found the most powerful locomotives in Australia. The Victorian Railways have several varieties of "Pacific" at work on express trains, while South Australia has gone still further, to use enormous 2–8–2s and 4–8–4s. One of the most important services in Victoria is that linking Melbourne with Sydney; the Victorian part of the journey is 190½ miles long, to Albury, where a change is made to the 4 ft. 8½ in. gauge train of the New South Wales Railways. Some of the highest sustained speed in Australia is made between Melbourne and Albury, the famous *"Spirit of Progress"* express being booked to average 53.2 m.p.h. over the entire 190½ miles.



A streamlined 4-6-2 of the Victorian Railways. It is this type that hauls the "Spirit of Progress" trains, one of the fastest in Australia. Photograph by courtesy of the Agent General for Victoria.

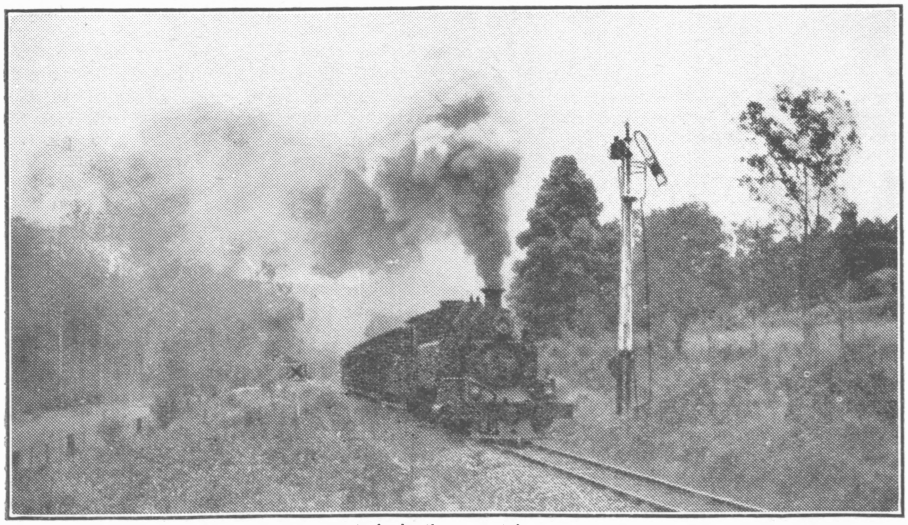
Before coming to the *"Spirit of Progress"* train, however, it is interesting to recall some of the stages that have led up to this remarkable service. Some of the most famous of Victorian locomotives are the "A2" class 4–6–0s. They are handsome English-looking engines, and as in the case of their counterparts in New South Wales, they have been successively modernised to keep them abreast of traffic requirements. The Victorian Railways, jointly with those of South Australia, operate a dynamometer car, and with this very careful research has been made into new devices, and upon experimental changes in various parts of existing engines. As a result important alterations to the front-ends of certain types of locomotive have been made and standardised, particularly to the blast pipe, and the draught arrangements generally. These researches have run on similar lines to the blast pipe experiments that have proved so successful on the Southern Railway in England.

Victorian locomotive design, despite the advantage of the ample loading gauge, has followed English rather than American practice, in that three-cylinder propulsion is coming into favour. The "S" class "Pacifics" retain too the English appearance characteristic of previous Victorian types; they are powerful engines, having three cylinders 20½ in. diameter by 28 in. stroke, which, in combination with 6 ft. drivers and a working pressure of 200 lb. per sq. in., gives them a tractive effort of 41,000 lb.—slightly in advance of the Stanier "Pacifics" on the L.M.S. Lately these engines have been streamlined for the working of the *"Spirit of Progress"* train, and have been named after men prominent in the early history of Victoria. One of these monsters is illustrated on this page; they are fitted with 12-wheeled tenders, carrying 7½ tons of coal and 13,000 gallons of water. The weight of engine and tender in working order is no less than 221 tons. They are painted royal blue, and lined in gold.

The *"Spirit of Progress"* may well be described as the last word in train construction so far as the Southern Hemisphere is concerned. Although the journey is completed in a little over 3½ hours, all the care and skill imaginable has been brought to bear upon the design. By the use of Corten steel, a light-weight alloy of great strength, refinements like air conditioning and sound insulation have been incorporated without any increase in weight above that of the older standard coaches. There are compartment coaches, panelled in the lovely Queensland ribbon walnut, and with seats upholstered in pleasing shades of chrome leather; a delightful restaurant car decorated in a general scheme of buff and green, and finally a parlour car at the rear. This last is divided into two "rooms," a smoking room, and an observation room something like that of the *"Coronation"* on the L.N.E.R. The tail of the train is just rounded, without any of the beaver-tail effect of Sir Nigel Gresley's masterpiece.

As in so many cases, where a travel novelty such as the *"Spirit of Progress"* has attracted a lot of business, the company has gone on with other schemes, of a smaller kind, yet equally effective in their results. Another crack express, *"The Overland,"* which runs between Melbourne and Adelaide, is painted in a special livery of green, with cream and black lining; while in the Melbourne district the boat train which brings ocean passengers from the Station Pier, Port Melbourne, to the great city terminus, Flinders St., is painted pale blue, with a silver roof. Skilful publicity touches like this are well calculated to make railway travel as attractive as possible. Even the suburban electric rolling stock is receiving attention in this way; rose-pink and grey are the colours now used, more soothing one would imagine to that grumpy "morning city-train" feeling than the pillar-box red of the London Transport electrics!

Important progress has been made also in recent years in the improving of the road. To reduce the number of rail joints, and so to provide smoother and quieter running, the rails have been welded on many stretches into standard lengths of 225 ft. As an experiment two sections on the Geelong line have been laid with rails welded into lengths of over 4,000 ft. In contrast to all this main line activity, the Victorian Railways include some fascinating stretches of narrow gauge branch line, 2 ft. 6 in. gauge, of which that running up into the mountain country at Lembrook is typical. The lower picture on the



Victorian Railway narrow gauge train in the mountain country. Photograph by R. Pearson.

previous page shows a train on this line near the quaintly named station of Cockatoo, and beside the fussy-little engine will be seen a somersault signal of true Great Northern type. This very distinctive pattern is standard in mechanically signalled territory on the Victorian Railways, though in the Melbourne suburban area, and other places where electric signalling is used, three-position upper-quadrant semaphores, similar to those of New South Wales, are to be found. In addition to the curious little engines seen on some narrow-gauge sections, there are modern Garratts, specially designed for the very restricted loading gauge, and capable of negotiating sharp curves. On the lines at Walhalla and Beech Forest some 2–6–0 + 0–6–2s are at work; these have driving wheels of only 3 ft. diameter, and although they have a total weight of only 69 tons they have a tractive effort of no less than 25,270 lb.—a striking example of what can be done with the Garratt type of engine.

There could scarcely be a greater contrast than between the narrow-gauge Victorian locomotives and the colossal engines working on the South Australian main lines. There are 2–8–2s and 2–8–4s for goods, and 4–6–2s and 4–8–4s for passenger work. The 4–8–4s have cylinders of truly North American dimensions, namely 26 in. diameter by 28 in. stroke; there is a booster on the trailing truck, and with this in action the tractive effort is no less than 59,000 lb. Engine and tender together weigh 233 tons. As can be seen from the accompanying picture of one of them, at the head of an Adelaide-Melbourne express, they are decidedly American in appearance; strangely enough however they were built in England, by Armstrong, Whitworth and Co. Ltd. On the main line running westward from Adelaide, which links up with the Trans-continental line to Western Australia, "Pacifics" are mainly used. In accordance with the prevailing fashion some of these are partly streamlined, though speeds are not high.

The railhead, so far as the South Australian system is concerned, is Port Pirie Junction, where *three* gauges meet. In addition to the 5 ft. 3 in. South Australian main line, this State has also a 3 ft. 6 in. gauge line running in; and the Commonwealth system is of course the standard 4 ft. 8½ in. The 3 ft. 6 in. gauge line brings iron ore down from the mines at Broken Hill in New South Wales, and the 4–8–0 engines thus engaged come alongside South Australian 4–6–2s, and the handsome 4–6–0s that take the Trans-continental trains westward. These latter are a modernised version of the original Beyer-Peacock 4–6–0s supplied to New South Wales, 50 years ago. They are used only as far as Port Augusta where the great new line begins. This was opened as recently as 1917.

"Sir Ronald Ferguson, with humble duty, begs to report to your Majesty the successful opening of the Transcontinental railway . . . . ." In those simple words the Governor-General of that time announced, by telegram, the completion of a work that may be compared to the Canadian Pacific Railway in Canada; not, indeed, in physical characteristics, but in its function and importance—that of providing one of the Empire's greatest highways. The remoteness of what Sir Ronald Ferguson called "the great and patriotic community in the West" had been felt as a weakness in the structure of the Australian Commonwealth; but the new line, laid across the well-nigh endless Nullabor Plain, did just the same for Western Australia as the C.P.R. did for British Columbia, which had, in pre-railway days, lain beyond the impassable barrier of the Rocky Mountains. From Port Augusta to Kalgoorlie the distance by rail is 1,053 miles, and some idea of the kind of country traversed may be gauged from the fact that on one remarkable stretch the track is dead straight for 330 miles!

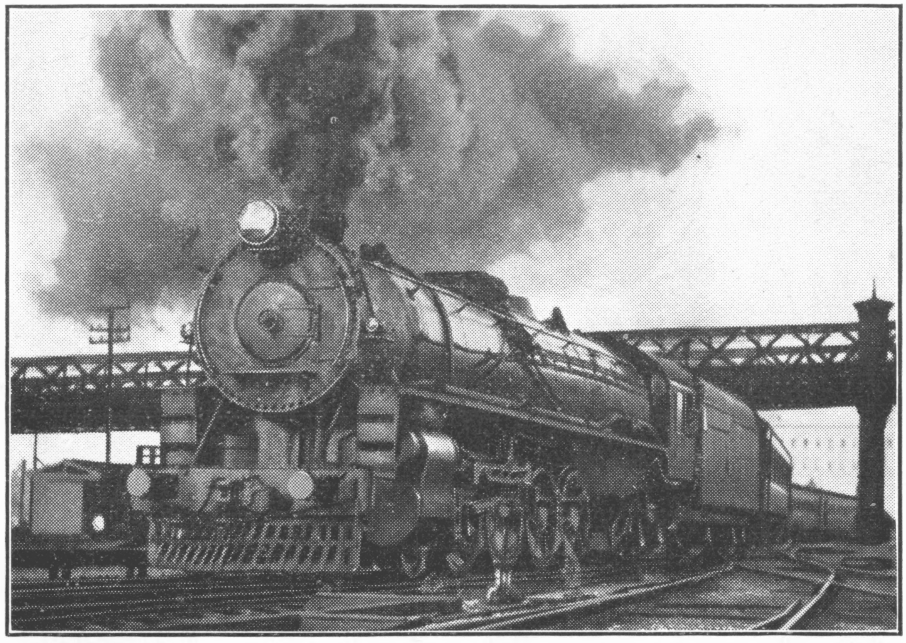
Travellers write of the extraordinary experience of crossing this great plain; apart from the single line of rails there is nothing in sight save the level plain and the sky. The country sweeps away to a circular horizon just as one sees from a ship when out of sight of all land. It might well be wondered how trains are operated over so deserted a countryside. Originally there were four sections, each about 250 miles long, engines being changed thrice in the journey from Port Augusta to Kalgoorlie; train services are not frequent, and a lot of time was spent by train crews waiting a return working to their home station. In those pioneer days the Class "G" 4–6–0s (New South Wales type) were used. Now however the fine "G.36" class 4–6–0s, also of New South Wales origin, are employed on the through trains, and they work through with only one intermediate change of engine, at Cook. For this through working of about 500 miles these locomotives are fitted with huge tenders carrying 17½ tons of coal and 12,000 gallons of water. The complete run of 1,107 miles from Kalgoorlie to Port Pirie Junction is now made in about 30 hours.

Readers will note that I have referred to this Transcontinental route as a Commonwealth line; unlike the definite State systems it is managed direct by the Federal Government. This supreme authority runs also some lines of less importance, one of which, on the 3 ft. 6 in. gauge, runs due north from Port Augusta to Oodnadatta, about 100 miles short of the boundary between South Australia and the Northern Territory. This line is now being extended for nearly 1,000 miles, to link up with Port Darwin on the north coast. When completed this north-south Transcontinental route will form yet another example of the astonishing enterprises that have characterised Australian railroading in the past.

Finally to be mentioned are the State railways of Western Australia. These consist mainly of a network based on the western seaboard, in much the same fashion as the Queensland system; the likeness is heightened by the use of the 3 ft. 6 in. gauge, and the fact of there existing several long routes leading into the interior. Rather over 4,000 miles of line are operated, yet the traffic is such as to need only 420 locomotives. One of the most important lines is that, 400 miles in length, connecting Perth, the State capital, with Kalgoorlie, the western end of the 4 ft. 8½ in. Transcontinental line. The locomotives are very much on the small side, even for the 3 ft. 6 in. gauge. "Pacifics" are used on nearly all main line passenger trains, but the majority of these develop less than 20,000 lb. tractive force. The Class "E" engines have cylinders 17 in. diameter by 23 in. stroke—about the size of one of the little "Jumbo" 2–4–0s of the old L. and N.W.R. in England; while the larger variety, known as Class "P," have 19 in. diameter cylinders, with 26 in. stroke. These engines have what I may call a South American appearance, rather like some of the Brazilian "Pacifics."

The railways of Western Australia are fortunate in having some well-equipped locomotive shops, and some considerably larger passenger engines of the 4–8–2 type are now building. It is anticipated that the first of these will be completed before the end of this year. As on the other sub-standard gauge systems in Australia, lightness of construction of the road has handicapped the design of powerful locomotives; but on the important Perth-Kalgoorlie line an extensive programme of bridge reconstruction has allowed the building of bigger engines to be begun.

Such is a glimpse of the very diverse conditions under which railway operation in Australia is conducted.



A giant 4-8-4 locomotive of the South Australian Railways leaving Adelaide with an express for Melbourne. Photograph by courtesy of the High Commissioner for Australia.

AIR NEWS

More Transatlantic Flights

On 19th-20th July last, British Airways' new Boeing flying boat *"Bristol,"* illustrated here, was flown from Foynes, Eire, to Baltimore, U.S.A. A stop was made at Botwood, Newfoundland, on the way, and the full trip took about 30 hrs. The well-known Capt. J. C. Kelly Rogers was in command, and the passengers on board included 30 British Airways employees who will form the ground staff of the company's base that is being established there for a proposed Britain-Baltimore service.

This was not the first British Airways westward crossing of the Atlantic this year, as earlier a Consolidated "Liberator" flying boat, partly converted for civil use by the company, flew to Canada. Capt. H. H. Balfour, Under-Secretary for Air, was on board.

An air service across the Atlantic is now being operated by the U.S. Army Air Corps with two four-engined bombers adapted for the work. One flight each way per week is made, and mails and United States officials are carried. A special route is followed.

Duke of Kent Flies to Canada

The Duke of Kent flew to Canada at the end of July last to begin a visit of about six weeks, during which he is inspecting establishments included in the Empire Air Training scheme. He is the first member of the Royal family to cross the Atlantic by air, and he made the trip in a Consolidated "Liberator."

About the same time Capt. H. H. Balfour returned from Canada after a three weeks' tour of inspection of R.A.F. and Army training schools there and in the United States, which involved about 2,000 miles of flying.

* * * *

A memorial tablet to the late Pilot Officer W. L. M. Fiske, R.A.F., the first American-born pilot to give his life for Britain in the present war, has been placed in the crypt of St. Paul's Cathedral. It was unveiled on the 4th July last, United States Independence Day, by Sir Archibald Sinclair, Secretary of State for Air.

Success of New Night Fighters

The steadily increasing success of R.A.F. night fighters in recent months has brought the Douglas "Havoc" frequently into the news.

This American machine is the fighter version of the Douglas D.B.7 twin-engined bomber. It is very heavily armed, and there have been several reports of enemy machines attacked by "Havocs" being blown to pieces in the air. Night fighting duties tend to become more and more specialised as the R.A.F. night fighter organisation gets built up, and there are already several different types of "Havoc," with various modifications to suit their special jobs. One operation in which this machine has excelled is night raiding the aerodromes in Northern France that harbour the German night bombers.

New Zealand—Australia Air Service Completes First Year

The trans-Tasman weekly air service between Auckland, New Zealand, and Sydney, Australia, has now been operating over a year. During the first 12 months 131 out of the 134 planned flights were made, and the average time for the 1,340-miles flight was just over 9 hrs. The fastest trip took only 6 hrs. 57 min., and was flown on 23rd March this year. Tasman Empire Airways operate the service with their 4-engined flying boats *"Aotearoa"* and *"Awarua."*

An additional service is flown once a fortnight to link up with the Pan American Airways service between the United States and Auckland.

A "Spitfire's" Victories

A "Spitfire" fighter given by Lady Davis, of Montreal, under the Canadian "Wings for Britain" Fund, has been named *"King's Messenger."* It has been in service with a famous fighter squadron that has 114 air victories to its credit, and during the first 10 days with this squadron the "Spitfire" accounted for four Messerschmitt Me 109s. The four successes were obtained during the R.A.F. Fighter Command offensive over Northern France. On one of the occasions it was piloted by a flying officer from Saskatchewan who has recently been awarded the D.S.C., and on another day by a Scottish squadron leader who has gained 17 victories.

The King Sees Air Cadets in Camp

When the King, who is Air Commodore-in-Chief of the Air Training Corps, recently inspected 500 cadets in their summer camp at a famous R.A.F. training school, he was very interested in the preparation of lunch in the camp kitchen in the open air.

The King was accompanied by Air Commodore Chamier, and after visiting the cadets he inspected the school workshops and aerodrome, where thousands of young airmen of the R.A.F. receive their training. He saw mobile, power-driven gun turrets being swung about by their gunners in mock action, and he was particularly interested in "George," the automatic pilot, rigged up to operate a dummy aeroplane on the ground.

The Camp Commandant is Flight Lieut. T. G. Patterson, organiser of the famous Duke of Yorks' camp at Southwold, and the Adjutant is Pilot Officer Bernard Joy, the well-known Arsenal centre half. The cadets have a busy week, attending lectures by R.A.F. instructors, seeing the R.A.F. Apprentices and Airmen training in engineering, rigging, and other technical subjects, and taking part in a variety of outdoor sports and exercises. The older cadets, if they are destined for air crew work, are taken on flights in Service aircraft—a treat for which there is keen competition. The consent of parents is necessary before a cadet can have a "flip."

A group of Scottish youths who are members of the Air Training Corps recently spent a week of their summer holiday in this way at a Coastal Command station in Scotland. They had a great thrill one day when they were introduced to the Flight Sergeant pilot of a Beaufort aircraft that had torpedoed a German pocket battleship off the Norwegian coast. He walked into the room during one of their lectures, and as he told them the thrilling story of how he hit the battleship, they regarded him with awe and admiration. Almost every day those boys who had "parents consent chits" were taken for flights in "Ansons" and "Hudsons" by pilots of the Royal Dutch Naval Air Service.

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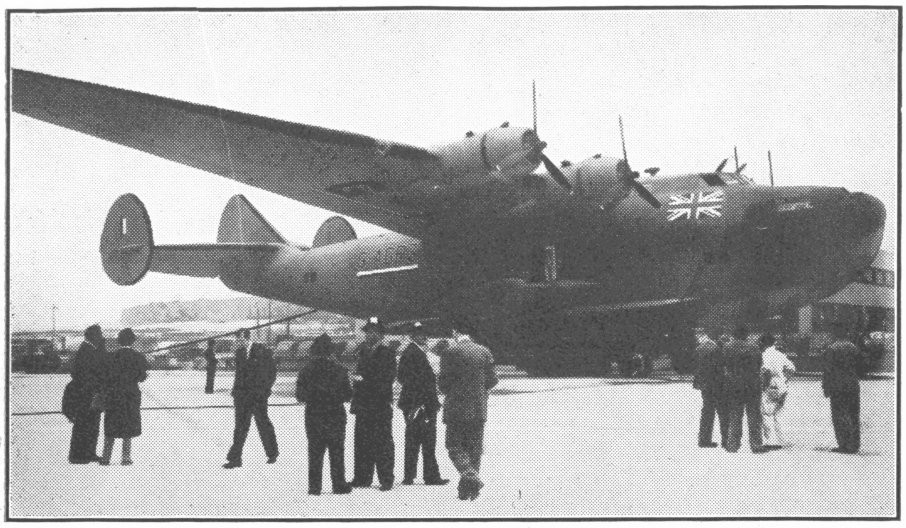
British Airways have established a flying-boat service between Cairo and Lagos, via the north of the Belgian Congo. Mail and priority passengers are carried.

"Bristol," one of the three new Boeing flying boats just delivered to British Airways, by whose courtesy this photograph and the upper one on the next page are reproduced.



This view of the "Bristol" gives some idea of the great size of these new boats.

Trans-Canada Air Lines Faster Services

Trans-Canada Air Lines non-stop service between Toronto and New York is now being flown three times daily. The 370-miles flight to New York takes 2 hrs. and the return trip 2 hrs. 15 min. Lockheed "Lodestar" machines are used.

Recent speeding-up has achieved a saving of 2 hrs. flying time on the Montreal-Vancouver air route, and of 30 min. on the Montreal-Halifax route. The company claim to provide the fastest New York—Vancouver air service, with a journey time of only 17 hrs., which is 5 hrs. less than the American services.

Military Aircraft Production in Canada

Military aircraft production on a big scale is now in full swing in Canada, and famous British types issuing from the factories include "Ansons," "Hampdens," and "Hurricanes," and D.H. "Tiger Moth" trainers. Many Westland "Lysander" Army Co-operation monoplanes have been produced for the Royal Canadian Air Force by the Aircraft Division of the National Steel Car Co. Ltd. The Noorduyn "Norseman," a notable Canadian trainer, and the Consolidated 28-5A amphibian, a United States type, are also being produced in large numbers in Canada.

The Latest Messerschmitt Me.109

During recent months the Luftwaffe have been putting into service a new version of the Messerschmitt Me.109 fighter, and already many of the new machines have been destroyed in combat with R.A.F. fighters. The most important feature of the revised Messerschmitt, the Me.109F, is the high-speed Mauser cannon fitted in the engine mounting and firing through the hub of the airscrew. This cannon fires 900 rounds a minute, which is 10 times faster than the firing rate of the two 20 mm. Oerlikon cannons in the wings of the earlier machine, the Me.109E. Only 200 rounds of ammunition are carried, however, enough to keep the gun in action for only 13½ sec. The Me.109F, like its predecessor, has two machine guns. They are of 7.9 mm. calibre and are mounted on top of the engine, and fire through the radius of the airscrew. The top speed of this fighter is 362 m.p.h. and the ceiling is about 40,000 ft.

Bruno Mussolini Killed

Bruno Mussolini, the 24-year old second son of Benito Mussolini, the Duce, was killed near Pisa airport, Italy, on 7th August last, when a new type of 4-engined bomber he was testing crashed as he was about to land.

Frozen Rivets for Aircraft Construction

The Consolidated Aircraft Corporation, U.S.A., producers of the well-known "Liberator" bombers for the R.A.F., make use of refrigeration to keep pliable the alloy rivets they use. The rivets are stored ready in a small ice-box alongside the operator, and there are kept below freezing point until withdrawn and swiftly inserted in the aeroplane under construction.

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"A1 Squadron at Training," a film of the Air Training Corps, will shortly be showing at cinemas throughout the country. The film gives an excellent insight into the training of the cadets of the Corps, and shows them both at work and play.

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The test flying of the first Lockheed Vega "Ventura" has begun at the Lockheed company's aerodrome at Burbank, U.S.A. This machine is a military version of the Lockheed "Lodestar" transport, and several hundreds are to be built for the R.A.F.

Aero Engine Production in the United States

Information is now available of important steps being taken by American motor car manufacturers to produce in large quantitites aero engines required for the tremendously increased output of aircraft in that country. At Chicago the Buick Corporation are erecting a large factory in which 1,200 h.p. Pratt and Whitney "Wasp" engines will be produced, and the Studebaker Corporation are erecting one from which 1,700 h.p. Wright "Cyclone" engines will be turned out on a big scale. Two other factories for this Corporation are under construction at South Bend and Fort Wayne, in Indiana, respectively. When these four factories are in full swing production from each will average 500 aero engines a month.

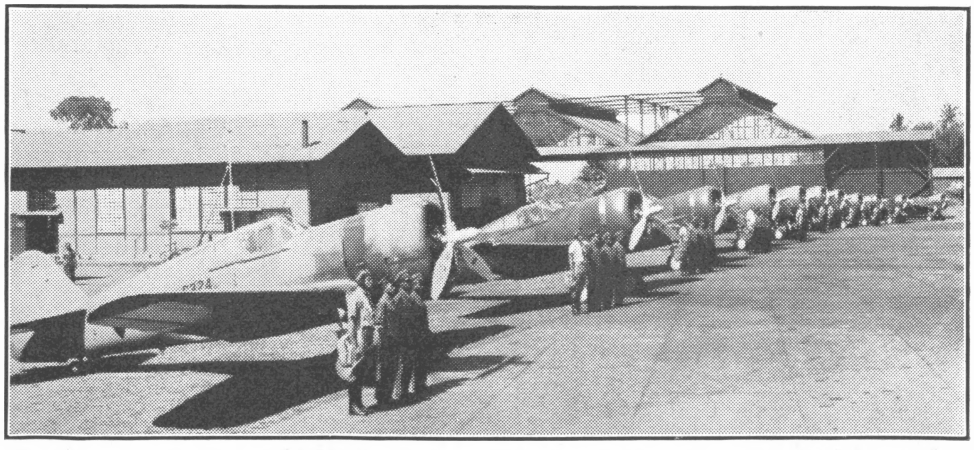
This rate of output is believed to have been attained already by the Allison Division of General Motors Corporation, which is concerned with the liquid-cooled Allison aero engine, and preparations for increasing production still further are in hand.

British Airways Staff Losses

British Airways lost two valuable employees when an Atlantic ferrying aircraft crashed into a hillside shortly after take-off on 10th August last, and the 22 people on board were killed. The British Airways men, Captain E. R. B. White and Radio Officer H. S. Green, were both born in India. White came to England in 1914, joined the Royal Air Force in 1921 as a boy mechanic and left in December 1930 with the rank of Sergeant Pilot. He joined Imperial Airways in the following year, and in 1936 established a record by flying the 2,970 miles from London, to Marseilles, Brindisi, and back to London, in 18 hrs. He was navigator on the first Imperial Airways Atlantic flight in 1940, and was seconded to Atfero, an Atlantic ferrying organisation, in the spring of this year.

Green served as a wireless operator at sea before joining Imperial Airways, and was then stationed on the company's yacht *"Imperia"* at Crete. He returned to England in 1940 and was stationed at Whitchurch until transferred to Atfero. He was an outstanding radio operator.

A further loss to British Airways occurred when Captain J. W. Stirling, their Superintendent of Engine Production until he was seconded to Air Transport Auxiliary, was killed in a motor accident last month. He was a veteran of aviation engineering, and made his first flight at Douai in 1911.



Curtiss Hawk 75A fighters of the Royal Netherlands East Indies Air Force "on the line" at the big air base at Bandoeng, Java, N.E.I. Photograph by courtesy of Curtiss-Wright Corporation, U.S.A.

French Indo-China

A Fascinating Land of 23,000,000 People

By Harold J. Shepstone, F.R.G.S.

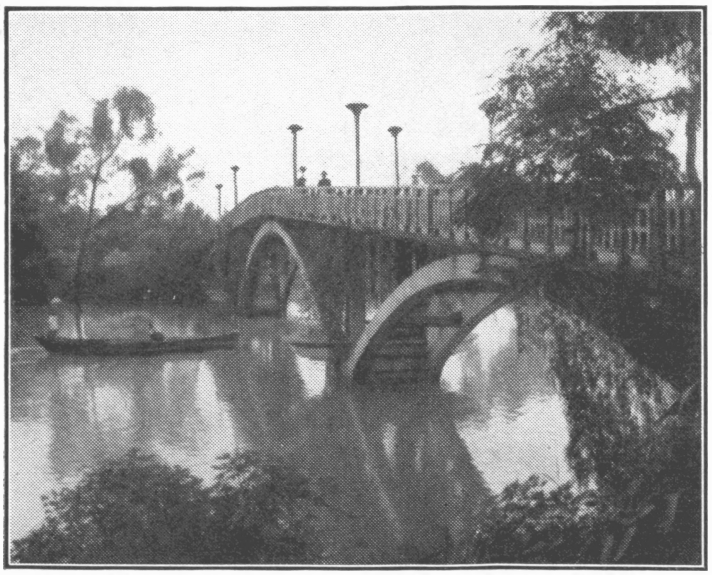
FRENCH Indo-China is one of the least known lands to British travellers. Yet it is a most fascinating country, rich in scenic beauty and attractions, and possessing great potential wealth. It was the jewel in France's colonial empire. It was her only possession that paid its way. No French dependency was more progressive and none more contented. During the first World War it furnished some 200,000 men as well as much money for the mother country.

It consists of the colony of Cochin-China, whose capital is Saigon; the four protectorates of Cambodia, Annam, Tonkin and Laos, and the leased territory of Kwang Chow Wan, a peninsula in Southern China. The area of these countries is about 300,000 square miles—as great and half again as that of France, and about six times that of England. The population number about 23,000,000, consisting of many different tribes, speaking many tongues, and representing varying degrees of civilisation and culture.

There are mighty mountain ranges clothed in thick forest, and vast stretches of jungle, the home of the tiger and other wild beasts. There are high plateaus, mighty rivers, deep gorges, and along the coast extensive stretches of flat, alluvial land. The long coastline is cut by numerous bays, and lying off the shore are many islands until recently the haunt of pirates. The climate varies from tropical and intense heat to the cool and temperate breezes of the highlands.

The colony of Cochin-China, lying at the southernmost tip of the country, has been a French possession since 1868; it consists mainly of the delta of the mighty Mekong River. In the same way as Egypt is a gift from the Nile, the lower portion of the colony is a present from the enormous Mekong, which flows down loaded with silt brought from the mountains of Tibet, 2,500 miles away. Here are miles and miles of rice-fields; you can motor for a whole day without losing sight of them. Cochin-China alone grows more than 2,000,000 tons of rice a year, and Cholon, a Chinese city just outside Saigon, is devoted largely to rice milling. The rice granaries are equipped with the very latest devices for handling the grain. Not only is rice the staple food of the people, but 1,800,000 tons are exported annually. We in this country know only three or four kinds of rice. There are many varieties, however, and in the East you can purchase rice that is perfectly golden in colour, or a pure white, or jet black. In size also the grain varies considerably.

Chinese coolie with a load of baskets in the streets of Saigon.

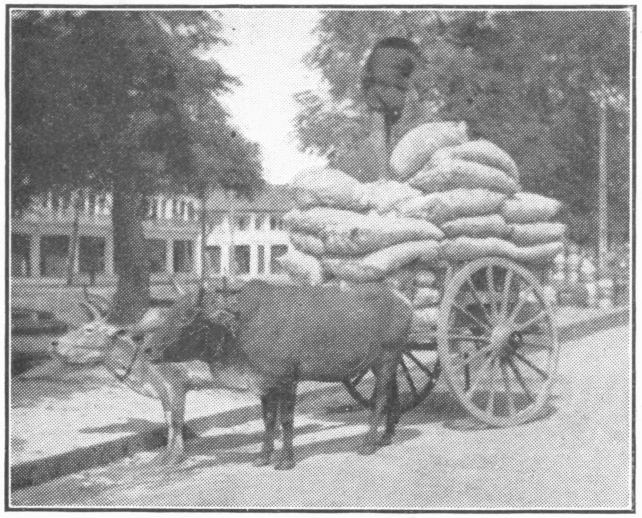


A picturesque bridge crossing the rives at Hue, the capital of Annam.

Saigon, the capital of Cochin-China, is to-day a centre of trade, and an object lesson of the way in which the best of Western civilisation may be made to blend with and adapt itself to that of the ancient East. It is a very picturesque and progressive city, with many fine public buildings, opera house, cinemas, stores, hotels and restaurants. During the day the streets and quays are bustling with the activity of multifarious traffic—motor cars, lorries, tramcars, rickshaws, bicycles, creaking ox-carts, and coolies as beasts of burden. Many business places close down during the hot hours of the afternoon, to open again from four o'clock to seven. At evening time cafe tables are pushed out on to the sidewalks, and here the French colonials gather and sip their coffee and carry on animated conversation as if they were in their homeland.

To the east of Cochin-China is the protectorate of Cambodia, the once mighty kingdom of the Khmers. They were of Hindu stock, and the greatest sculptors and artists the ancient East produced. Their capital city, Angkor, was adorned with artistic palaces and great temples. They were driven out by the Mongol

masters of China, and their incomparable handiwork was swallowed up by the jungle. It was the French naturalist M. Mouhat who stumbled across the lost city some three score years ago, since when French savants have been toiling to rescue it from its mausoleum of jungle greenery.



Bullock cart bringing a load of rice into Saigon.

What is considered the gem of the city is the temple of Angkor Vat, which was consecrated to the worship of Buddha. It is some 820 ft. long by 656 ft. broad. It is formed in terraces, one above the other, and there are five towers, of which the central one is 123 ft. high. Every inch of stonework is finely and minutely sculptured. Just before the present conflict a French scholar was sent from Paris to take a series of photographs of the intricate traceries and carvings for use as patterns for lacework and tapestries.

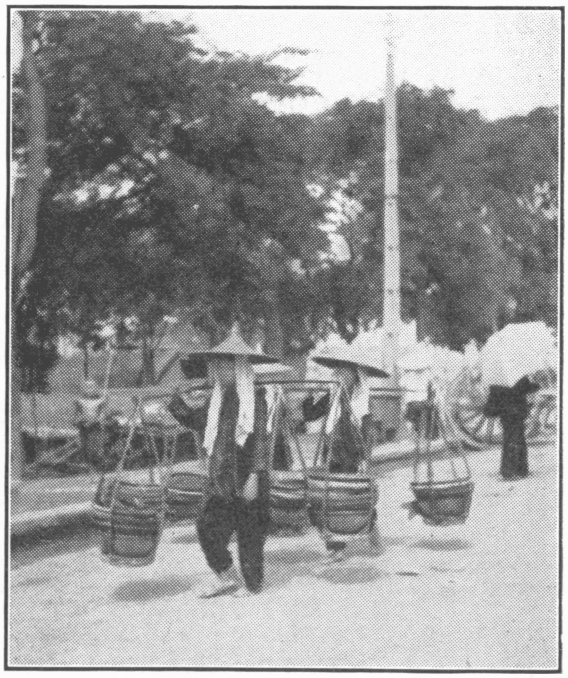
Angkor stands by the great lake of Toule Sap, which acts as a sort of natural regulator for the summer floods of the Mekong. When the river is at its highest the lake is 118 miles long by 15½ miles broad, with an average depth of 40 ft. In the dry season, however, this immense inland sea is reduced to one-sixth of its former dimensions. A branch road has been built from Angkor to the famous Mandarin Way, thus making the ruins easily accessible. The Mandarin Way, officially known as Route Colonial No. 1, is one of the most picturesque highways in the East. Starting at the frontier of Siam, or Thailand, it crosses Cambodia and Cochin-China, thence up the long coast of Annam and across Tonkin to the Gate of China, a distance of 1,600 miles. By means of this road thousands of tons of military supplies have been smuggled into China. There are in addition over 5,000 miles of motor roads in the country, running, like the railways, from north to south. The great Trans-Indo-China Railway, which enables one to do the journey from Saigon to Hanoi, the capital of Tonkin, in a little over 24 hours, has a length of 1,100 miles.

Although Annam, that long strip of territory along the coast, is occupied by a medley of races, it is in many parts a replica of Old China. As it is a protectorate, a large amount of self-government is allowed. Thus the descendant of the old Annamese Emperors rules in name, if he does not actually govern. At Hue, the capital, he maintains an imperial palace with its throne room, reception halls, and ancestral temples containing the altars to dead kings. Hue has been called the Versailles and the Venice of the East. It lies but a few miles from the sea on the banks of the winding river, known as the "River of Perfumes," a name given to it because of the sweet-scented flowering trees growing along its banks.

The jungles of Annam abound in wild game of many sorts, tiger, leopard, deer, buffalo and other animals. But the Annamese have a great respect for the tiger, and round Nha Trang there are many shrines erected to him. They regard him almost as a god, and speak of him as "My Lord Tiger." It has sometimes happened that, when a European has trapped a tiger, the natives on discovering his august presence in the morning have collected round the trap, begged him to forgive the insult he has received, made a great tam-tam with their clapping instruments, and let him go. In such circumstances it is useless to ask the Annamese to act as beaters in a tiger hunt. They fear that he would take revenge, not only on them but on the whole of their village.

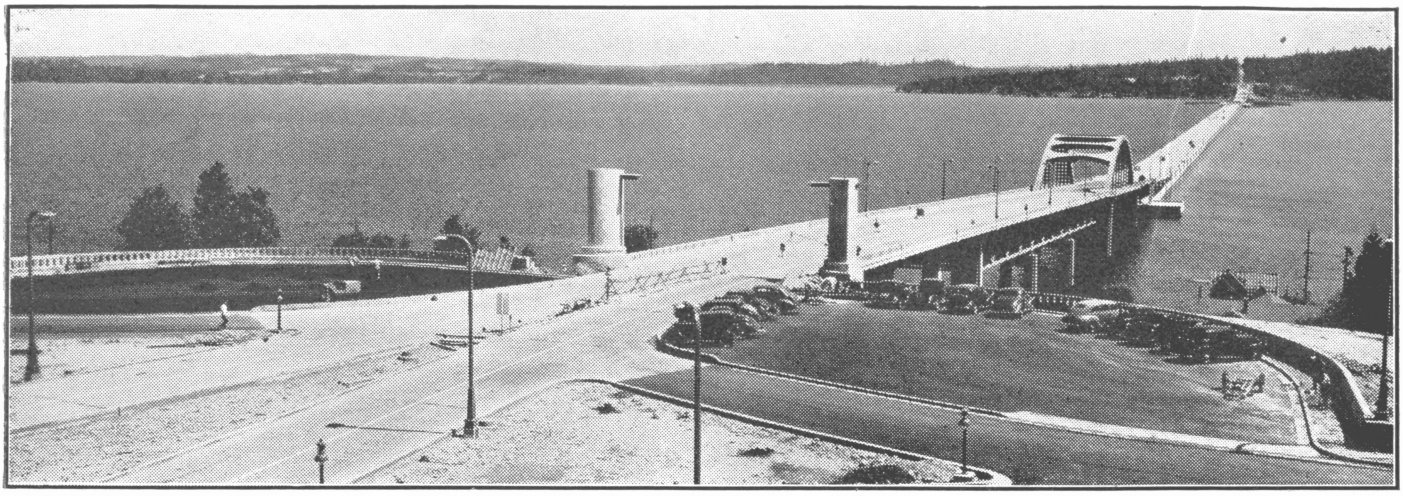
The quaint customs and beliefs of French Indo-China's many races present an interesting study. The chief feature of the Annamese New Year day celebrations is the procession of the dragon. The dragon is a many-hued monster often about 30 yards long. It is borne by men inside it, who at night carry torches so that the markings on the skin are lighted up. It is a most fearsome-looking object with fire spurting from its eyes, mouth and nostrils, but it sends a crowd into ecstasies of enthusiasm. Their manner of applause in their theatres is quaint. It is never displayed by the clapping of hands, but if anyone in the audience wishes to show his appreciation he does so by rushing up to a gong placed for the purpose near the stage and banging it. Needless to add, the gong is hardly ever at rest. Among the Champs who dwell in the highlands it is the women who propose, not the men. They select the young man they wish to marry, and send their parents, with two cakes and some chewing betel, to the shy creature. He is spared words, having only to taste a cake as a sign he is willing to become engaged.

On the southern coast of Annam is the much-talked-of Camranh Bay.



The women of French Indo-China do a large amount of porterage. Here they are seen carrying produce to market.

It is a great natural deepwater anchorage, protected on all sides by high hills. The French have done practically nothing in the way of fortifying and dredging it, however. It is not even buoyed or lighted. Much time and money (Cont. on page 298)



The world's largest floating bridge, which crosses Lake Washington between Mercer Island and Seattle. Photograph by courtesy of Washington State Tollbridge Authority.

A Floating Bridge 1¼ Miles in Length

ONE of the great gateways of the United States to the Pacific Ocean, and particularly to Alaska, is Seattle. This city of nearly 400,000 people is situated on the shore of Puget Sound, which runs deep into the Continent to a distance of more than 100 miles, and its great value as a port makes it necessary that it should be easily reached both by road and rail. Unfortunately the city is built on a narrow neck of land between Puget Sound itself and Lake Washington, which stretches north and south behind the city and prevents direct access to it by land.

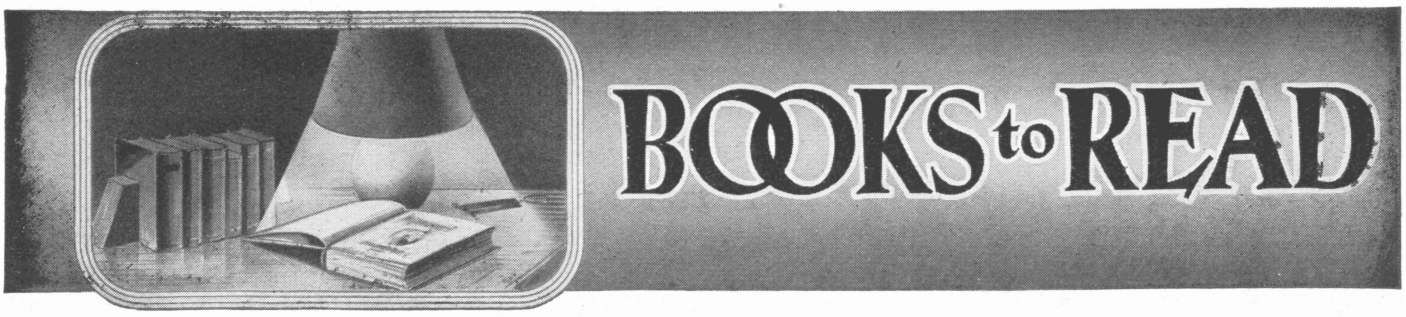
In these circumstances it is only natural that the possibility of bridging the lake should be considered. Fortunately there is a large island, called Mercer Island, in the lake itself, and this can now be reached from Seattle by means of a gigantic floating bridge, the largest of its kind ever constructed, while from Mercer Island to the mainland there stretches another bridge of steel and reinforced concrete carried on piers in the more usual manner. These form part of a remarkable highway system by which road traffic from the East can drive straight into the centre of Seattle instead of making a lengthy detour north or south of Lake Washington.

The central feature of the scheme, and the one that gives it its great novelty, is the floating bridge, which has a total length of 6,561 ft., and a weight of nearly 90,000 tons, making it the largest floating structure in the world. Floating bridges are not new. Bridges of this kind, for highway or railway traffic, have been constructed in various parts of the world, the most recent example being the Hobart Bridge in Tasmania, but none has been built of concrete like that at Seattle, nor is there another nearly 1¼ miles in length. A cantilever or suspension bridge might have been built instead, but the only suitable point for either was much farther south, where Mercer Island approaches the mainland more closely, and in that position the distance saved would be comparatively insignificant. Apart from that it is doubtful if sufficiently secure foundations for concrete piers could have been discovered, and the cost would have been far higher.

From the centre of Seattle the bridge is approached along a concrete road with four traffic lanes. This road is carried on bridges over the main city highways, and burrows through twin tubes for a distance of 1,466 ft. under a ridge to reach the shore of Lake Washington. The floating structure itself consists of 25 reinforced concrete floating sections rigidly bolted together. Of these sections 10 are 350 ft. long, 59 ft. wide, and 14 ft. deep, and they draw 7 ft. of water with 7 ft. of freeboard. Each is divided into 96 cubical watertight cells measuring approximately 14 ft. each way, and weighs 4,558 tons. The remaining 15 special sections are of various lengths, and are so constructed that they can be made to float a little lower or a little higher by pumping water into or out of certain cells. This is necessary because the level of the lake changes with the seasons. The total variation is about 3 ft., and the use of these adjustable sections allows easy passage from the fixed approaches to the central floating sections, whatever the height of water in the river. Gigantic anchors hold the bridge in position.

The largest of the special sections is a novel draw span that can be opened to allow the passage of boats. This is 378 ft. long, so that if stood on end it would be as high as a building of nearly 40 storeys. It is placed at the Mercer Island end of the floating bridge. At a point 1,560 ft. from the Island the four traffic lanes separate, two going to the north and two to the south of a great well 220 ft. long and 60 ft. wide, passing right along its sides before rejoining each other, on the moving span. This can be pulled back into the well, then leaving a passage wide enough for boats carrying lumber and other products from the mills and factories on the shores of the Lake. The draw span is hauled along by two 75-h.p. motors connected to drums that drive an endless cable, and only 1½ min. are required to open or close the waterway.

The approach from the mainland to the movable span is provided by an arch bridge, under which small boats can pass readily. At the opposite end of the long line of pontoons leading to Mercer Island is a similar fixed inclined approach 960 ft. in length. A road across Mercer Island and the steel and concrete bridge already mentioned connects it to the mainland, and the concrete highway is carried forward from there to its eastern end, nearly 6½ miles from its starting point.



Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, we can supply copies of these books to readers who cannot obtain them through the usual channels. Order from Book Dept., Meccano Limited, Binns Road, Liverpool 13, adding 1/- for postage to the price. Postage on different books varies, but any balance remaining will be refunded.

"British Fighter Planes"

By C. G. GREY (Faber and Faber. 5/- net)

The superiority of British fighter aircraft over those of the enemy has been one of the outstanding features of the present war. In this timely book the development of these fine British machines is described by C. G. Grey, founder of the *"Aeroplane"* in 1911 and editor until September 1939. Readers who remember Mr. Grey's article on *"The Jobs of the R.A.F. Commands"* in June last will expect great things from this book and they will not be disappointed. Mr. Grey writes in a vigorous and breezy style that makes even technical details interesting, and draws freely upon his wealth of personal experience of British aviation.

Beginning with a survey of the work of the fighters in 1914-18, the author passes on to the war of to-day. He gives a graphic description of the part played by the R.A.F. during the evacuation from Dunkirk. "Between the 'Hurricanes,' 'Spitfires' and 'Defiants' the German bombers were massacred. We shall probably never know their losses. Our own losses were fantastically small, considering the execution our fighters did." Next we come to the mass attacks on England in which our fighters for the first time met regular formations of the Messerschmitt 110. "Our fighters swept out from the fighter stations in the south-east of England, and massacred the Germans, as they had done in Flanders."

The second section of the book deals with armament and armour and concludes with a chapter on night fighting that will be read with special interest.

The most interesting part of the book is yet to come, however. The author gives us what he calls the "pedigrees" of the British fighting aircraft. He describes the development of each aeroplane, with fascinating glimpses of the personalities of the men concerned in the work. Beginning with the "Bristol" Blenheim, we are introduced in turn to the Fairey "Fulmar," the Gloster "Gladiator," the Hawker "Hurricane" and "Tornado," the Vickers Supermarine "Spitfire," the Boulton-Paul "Defiant" and the Westland "Whirlwind"; and after reading this section we feel that we have a really practical and personal knowledge of these wonderful aircraft. A section on aero-motors follows, giving a wealth of information of just the kind that *"M.M."* aeroplane enthusiasts will welcome. The amount of detail is surprising, but it is so presented that it never becomes wearisome. Specifications of fighters and their motors provide further useful detail, and specially welcome is a brief survey of the American fighters that have been adopted into the R.A.F. and the Fleet Air Arm.

Finally, apparently as reluctant to take leave of his readers as they will be to part with him, Mr. Grey adds a postscript dealing with the Hawker "Typhoon" and its engine the Napier "Sabre."

This fascinating book is fully illustrated by well chosen photographs.

"Man and his Creatures"

By H. C. KNAPP-FISHER (Routledge. 7/6 net)

It is impossible to think of a world without the dogs, cats, horses and other creatures that are Man's friends and helpers, and for this reason Mr. Knapp-Fisher's pleasant story is one that will be read with the greatest enjoyment. The friendly and helpful associations of which he writes began far back in prehistoric times, and his book is packed with incidents and stories from all ages.

Owing to difficulties that have arisen as the resul of war conditions it is impossible to guarantee the immediate delivery of books ordered in accordance with the scheme explained at the head of the first column on this page. For this reason readers who order books must be prepared for some delay, but every effort will be made to ensure speedy despatch.

The dog of course is given prominence among the friends of man. The earliest dog seems to have been something like the modern Chow, and was a wild creature of Central Asia, the area in which he was first tamed. There he was a hunter, and probably was used as a guide by men in search of game, the association becoming closer until it reached complete understanding. It is interesting to learn that wild dogs cannot bark, and it has been suggested that barking is an attempt on the part of the dog to imitate Man's speech.

The author has equally interesting stories to tell us about the horse, the taming of which has given Man greater mobility and helped him to develop his civilisation by providing him with an ideal beast of burden, as well as a friend in sport. The elephant, the wild beast with a hand, has played a similar part in the East, and the camel has proved its worth to us as the only means of crossing deserts until the invention of the motor car. The camel's hump has always been a source of wonder. This creature may have learned to store food and water when hunted far out into desert places, for it certainly had no hump before Man began to interfere with it.

Animals in war and sport provide material for two fascinating sections of the book, both full of fine stories. The first war horse was too small to ride and was harnessed to a chariot, and the earliest "blitzkrieg" on record seems to be one in which an army of horse chariots overwhelmed the Egyptians nearly 4,000 years ago. Elephants came into the picture when Alexander conquered Persia. The camels that figured in wars in India and Egypt, and under Lawrence in Arabia during the 1914-18 war, also find place in the section, which ends with the story of the dogs trained as messengers to cross the fire-raked ground of the battle front in Flanders.

The book is illustrated by 44 drawings.

"Running Deer"

By GEOFFREY TREASE (Harrap. 5/- net)

Mr. Trease has written a very fine Indian story, laid in the days when the white man was penetrating into the Prairie Region and the red man was making his last stand against the oncoming wave of settlers. It is the story of Hawk, the son of a Chief whom we see first as a boy enjoying buffalo hunting and other delights, and then as a Chief, with the name of Running Deer. He makes the acquaintance of white settlers who help him after a fierce fight with rival Indians. The story then becomes more and more exciting, for the temper of the Indians rises and fighting breaks out. In this Running Deer plays an important part, especially in the famous attack in which the United States General Custer and his force were exterminated.

"Royal Navy at War"

By VICE-ADMIRAL G. E. HARPER, C.B., M.V.O. (John Murray and the Pilot Press. 6/- net)

Of the many books on the Navy published since war broke out this is certainly one of the most interesting and attractive. The author, who has had a very distinguished career, opens his book with a sort of running commentary on the history of the Navy and gives us an insight into the part the Navy plays in wartime operations. He then commences his survey of the ships of the Navy, beginning with the battleship, "the strongest unit of a fleet at sea in the same way as in the past a ship-of-the-line or line-of-battle ship was the strongest." Cruisers, which have to be prepared to tackle almost any job, are interesting in their variety, and destroyers and motor torpedo boats have jobs of fascinating interest. After dealing with submarines the author passes on to aircraft carriers and the Fleet Air Arm, and tells the story of the convoys that have provided such an effective reply to the enemy's raiding submarines and aircraft. The book concludes with an interesting note on life in the Navy.

The illustrations to this volume, which have been prepared with the co-operation of the Ministry of Information, are of quite outstanding interest, and give a vivid impression of the Navy in action.

New Meccano Models

Three Novel and Easily-Built Subjects

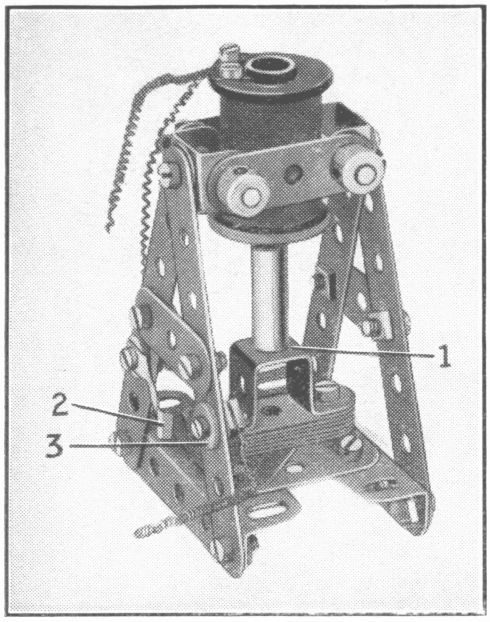


Fig. 1. A simple model electric hammer.

THE first model we are describing this month is the novel drop hammer shown in Fig. 1. This is electrically-operated, and its construction is commenced by assembling the anvil 1 and base, details of which are clear from the illustration.

A Magnet Coil with Core is gripped between two 1½″ Strips attached to the Double Brackets by 1½″ Rods and Collars. The model is operated by pressing a key switch consisting of a Pendulum Connection 2 insulated from one of the 3½″ Strips. The Pendulum Connection is bent as shown, and when depressed makes contact with a 6 B.A. Bolt 3 that is insulated from the other 3½″ Strip on the same side of the model as that to which the Pendulum Connection is secured. The 6 B.A. Bolt of the Pendulum Connection is connected to one terminal of the Magnet Coil. The other terminal of the Coil and the 6 B.A. Bolt 3 are then joined to the terminals of a flashlamp battery.

Parts required to build model drop hammer: 4 of No. 3; 14 of No. 6a; 2 of No. 9d; 2 of No. 11; 2 of No. 18a; 16 of No. 37a; 14 of No. 37b; 1 of No. 45; 4 of No. 59; 2 of No. 111c; 1 of No. 172; 2 of No. 182; 1 Elektron part No. 1538; 1 of No. 1539; 2 of No. 1561; 2 of No. 1573; 4 of No. 1583.

The model shown in Fig. 2 represents a man planing a piece of wood, and is designed for construction from the contents of Outfit No. 2.

The body of the man is built from two 5½″×1½″ Flexible Plates. These are bent and bolted at the back to a 2½″ Strip forming his neck. His left arm, a 2½″ Cranked Curved Strip, is pivotally connected to a ½″×½″ Angle Bracket bolted to his body, and his right arm is a ½″ Reversed Angle Bracket bolted to a Flat Bracket. The turned-up ends of two 2½″×½″ Double Angle Strips are bolted together to form one side and the top of the plane, the remaining side being a 2½″ Strip bolted to the upper Double Angle Strip by two ½″×½″ Angle Brackets. The blade, and the wedge that holds it in position, are formed by bolting a Cord Anchoring Spring to the upper Double Angle Strip.

The man's right arm is lock-nutted to the rear end of the 2½″ Strip and his left arm is pivoted to a Flat Bracket bolted to the forward end of this Strip. The legs are 2½″ Strips and the feet are represented by Flat Brackets. The man is held in position by bolting his right leg to the side of the bench.

The model is operated by turning a 1″ Pulley fixed on a 2″ Rod journalled in the side of the bench and a Trunnion bolted to the Plate 1. A Bush Wheel is mounted on the other end of the Rod and a length of Cord is attached to it by a lock-nutted Bolt. The Cord is passed over a 1″ Pulley 5 mounted on a ⅜″ Bolt inserted in the end hole of a 2½″ Strip. The other end of the Cord is fastened, together with a 2½″ Driving Band, to the end of the plane. The Driving Band is secured to the Flanged Plate.

Parts required to build model woodworker: 4 of No. 2; 5 of No. 5; 4 of No. 10; 8 of No. 12; 1 of No. 17; 3 of No. 22; 1 of No. 24; 46 of No. 37a; 38 of No. 37b; 4 of No. 38; 1 of No. 40; 2 of No. 48a; 1 of No. 52; 1 of No. 90a; 4 of No. 111c; 1 of No. 125; 1 of No. 126; 2 of No. 155a; 1 of No. 176; 1 of No. 186; 2 of No. 188; 2 of No. 189; 2 of No. 190; 1 of No. 191; 2 of No. 200.

Each of the springs for the front and rear axles is built up from 1½″, 2½″, 3½″ and 4½″ Strips bolted together. Those for the front axle are attached to a Face Plate 2, which forms the second ball race. In the groove formed between the flange of the Wheel Flange 1 and the edges of the 1¼″ Discs bolted to it, 14 Steel Balls are placed, and the Face Plate 2 is then placed over them. A 1½″ Rod gripped in the boss of this Face Plate is passed through the Discs, the Wheel Flange and Girder attached by ½″×½″ Angle Brackets to 1½″ Strips. At their lower ends the Strips are secured to Cranked Curved Strips bolted together as shown to form the sides of the carriage. A 2½″ Strip and a 2½″×2½″ Flexible Plate are also secured to these Cranked Curved Strips by Angle Brackets, and a Wheel Flange 1 and four 1¼″ Discs, are bolted to the Strip, but spaced from it by Washers.

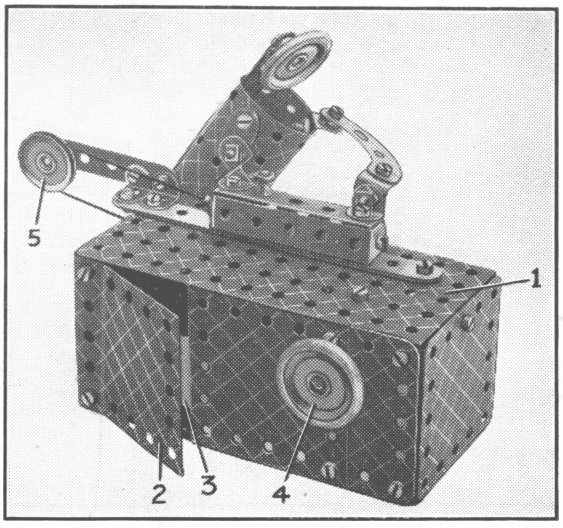


Fig. 2. A working model of a man planing. It can be built from parts in Outfit No. 2.

The novel model shown in Fig. 3, represents a Chinese "Ma-tchee" carriage and horse, and its construction is commenced by building up the front of the carriage. A 2½″×2½″ Flexible Plate is bolted at its upper end to a 2½″ Angle Bracket, and is fitted with a Collar on its upper end.

The horse is constructed by bolting a 1½″ Corner Bracket at each side of a Boiler and Boiler End. The rear legs consist of 3″ Strips with Flat Brackets secured to their lower ends and are attached to the lower corners of the Brackets. The left foreleg is also a 3″ Strip to which is bolted a Flat Bracket, and the right foreleg is a 2½″ large radius Curved Strip attached to a 1½″ Strip. The head consists of 2″ Strips that are secured to Cranked Curved Strips bolted to 2½″ × 2½″ Flexible Plates bent to form the neck. These Plates are bolted to the inside of the Boiler.

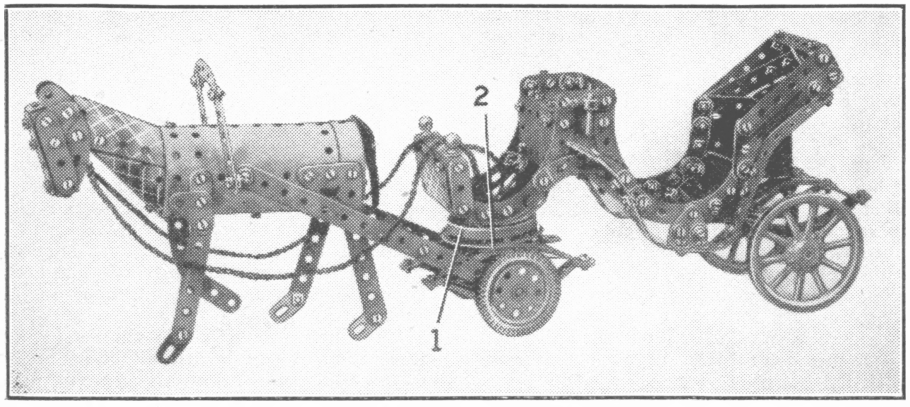


Fig. 3. A Chinese "Ma-tchee" carriage and horse.

Parts required to build model horse and carriage: 2 of No. 1b; 2 of No. 2; 10 of No. 2a; 8 of No. 3; 7 of No. 4; 14 of No. 5; 3 of No. 6; 15 of No. 6a; 1 of No. 9d; 7 of No. 10; 2 of No. 11; 43 of No. 12; 1 of No. 12a; 3 of No. 12c; 1 of No. 15b; 1 of No. 16; 1 of No. 18a; 2 of No. 18b; 2 of No. 19a; 2 of No. 21; 171 of No. 37a; 165 of No. 37b; 25 of No. 38; 1 of No. 40; 1 of No. 48a; 1 of No. 59; 2 of No. 77; 2 of No. 89a; 5 of No. 90; 9 of No. 90a; 1 of No. 109; 10 of No. 111c; 14 of No. 117; 2 of No. 133; 4 of No. 133a; 2 of No. 136; 1 of No. 137; 2 of No. 142d; 1 of No. 162a; 1 of No. 162b; 2 of No. 165; 7 of No. 188; 4 of No. 190; 2 of No. 190a; 1 of No. 192; 4 of No. 217a.

Suggestions Section

By "Spanner"

(519) A Rotor for a Water-Motor

(E. J. Henry, Cardiff)

An easily built rotor for use in a water-motor is shown in Fig. 519, and its construction is based on an idea submitted by E. J. Henry, Cardiff. Its component parts are few and simple, the main requirement being eight Dredger Buckets.

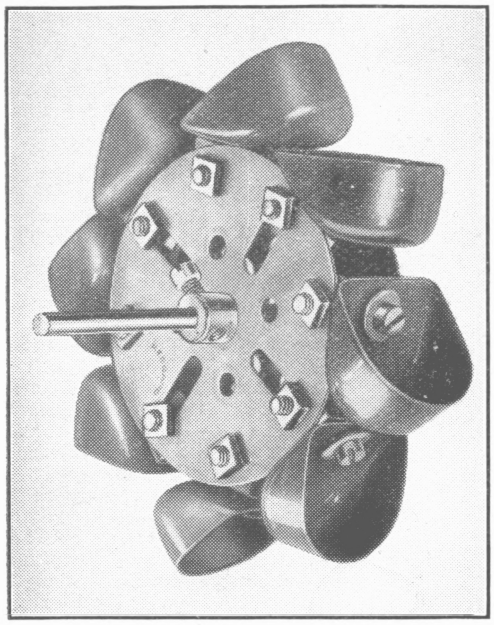


Fig. 519.

The clips are removed from these and the Buckets are then bolted to Double Brackets fixed between two Face Plates as shown. The Double Brackets are bolted in place by means of ¾" Bolts. The axle is gripped in the bosses of the Face Plates.

A wheel of this construction incorporated in a water motor would provide a powerful driving unit, and the building of such a device is an interesting pastime.

(520) 2½ Million to 1 Gear Ratio

("Spanner")

In the "*M.M.*" for January 1931 I described a compact gear-box that gave the enormous speed ratio of 2½ millions to one. Several model-builders who did not see that issue, have written to me asking for details of this novel device, and for their benefit and that of others who may be interested I am describing it again. The gear-box is shown in Fig. 520, and it was designed by Major Hatcher, the inventor of this type of gear-box for actual engineering purposes. It is known as the "H-R Gear" and is designed for all purposes and is obtainable in numerous different sizes. The H-R gear is the smallest speed reducer for a given output in the world. "*M.M.*" readers will have no difficulty in believing this statement after examining the Meccano model.

I do not know of any practical use to which a 2½ million to one ratio could be put in Meccano model-building, but the gear-box is of great interest as a novelty and as a demonstration of the possibilities of worm gearing.

As will be seen from Fig. 520 the model consists merely of an arrangement of Meccano Worms, the list of parts it incorporates being as follows:

2 of No. 3; 4 of No. 5; 4 of No. 9f; 2 of No. 15a; 3 of No. 16; 1 of No. 17; 5 of No. 26; 5 of No. 32; 18 of No. 37; 1 of No. 45; 1 of No. 48a; 1 of No. 48b; 9 of No. 59; 1 of No. 62; 1 of No. 115.

The Rod 1 is only 2" long, and in addition to the handle it carries a Worm 2. Its inner end is inserted in the centre bore of a ½" Pinion secured to the driven Rod 3. A Washer is placed between the Worm and the Pinion. The Rod 3 is journalled in the 2½" × ½" Double Angle Strip 4 and in a Double Bent Strip bolted to the Strip 4. The Worm 2 engages with a ½" Pinion secured to Rod 5, which carries another Worm 6 meshing with another ½" Pinion on a Rod 7. Rod 7 carries a third worm that in turn, engages with the ½" Pinion 8 on the Rod of the fourth Worm 9. This Worm engages with yet another Pinion that is secured to the Rod 10, and a Worm 11 on the latter drives the Pinion on the driven Rod 3.

A single Meccano Worm engaging with a ½" Pinion (19-teeth) provides a speed ratio of 19-1 and since this gear train is repeated five times a simple multiplication sum will show any Meccano user that the gear-box illustrated affords a ratio of 2,476,099 to 1.

Of course, it is not necessary to employ the whole of the gear train; the drive can be taken from any one of the intermediate transverse shafts 5, 7, 7a and 10, when the ratios obtained would be 19; 361; 6,859; and 130,321 to 1, respectively. These ratios would be found very useful in Meccano engineering when extremely slow movements are required, or when it is necessary to overcome very great strains.

(521) Trolley for Tramcars and Electric Buses

(D. Croome, Wood Green, N.22)

The building of model tramcars is is a popular pastime with many Meccano enthusiasts for a subject of this kind allows plenty of scope for originality in design. The interest of such models can be enhanced by fitting them with practical trolleys that will pick up operating current from overhead conductor wires.

A suitable trolley for this purpose is shown in Fig. 521 and it is quite simple in construction. It may be modified slightly to allow of its incorporation in tramcars and trolley buses of all types.

Two Double Brackets are bolted at one end of a 1½" Strip and at the other end of the Strip a Swivel Bearing is fixed, the 1½" Strip being lock-nutted to a Reversed Angle Bracket. An 11½" Rod is journalled in the Swivel Bearing, and carries at one end a small Fork Piece, in the arms of which a ½" loose Pulley is mounted. The Pulley is spaced from the Fork Piece by two Washers placed at each side of it. The Rod also carries a Coupling, to which two Springs are fixed by ¾" Bolts. The other ends of the Springs

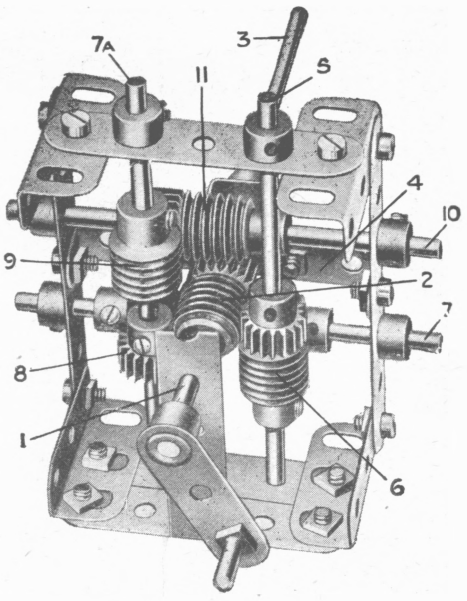


Fig. 520.

are held by a 1½" Rod which has a Collar at each end. The Reversed Angle Bracket is bolted firmly to the top of the tramcar or trolleybus, but must be electrically insulated from it if the trolley is to be put to practical use.

(522) Coupled Clockwork Control Levers

When building the No. 1a or No. 2 type Meccano Clockwork Motors into models it is sometimes a little difficult to arrange the control levers in positions where they can be reached easily to operate them. In these circumstances it is a good plan to simplify the control by coupling the levers together, and one method of accomplishing this is as follows. A 5½" Strip is attached to the reversing lever, and its centre hole is fitted with a lock-nutted Bolt that supports a 3" Strip. The latter is connected to the brake lever by means of a second lock-nutted bolt. Then the Motor can be put in forward or reverse gear and the brake applied by moving the 3" Strip vertically.

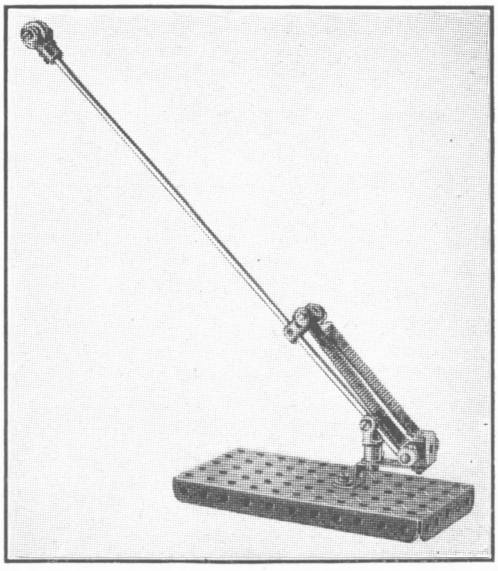
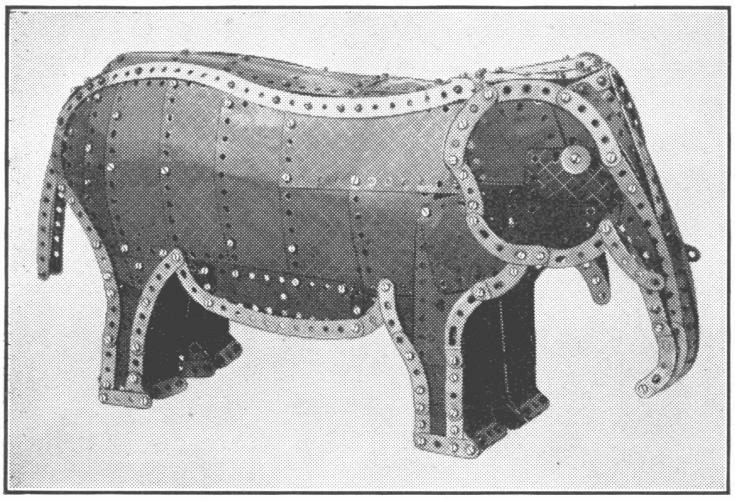


Fig. 521.

Model-Building Competitions

. . . — Novel Victory "V" Competition . . . —

This month we announce a novel model-building contest which, we feel sure, will make a big appeal to model-builders of all ages. The central feature of the competition is Britain's Victory "V" campaign, which has fired the imagination of people over all the countries temporarily occupied by our enemies.



A Meccano "Jumbo." It is the work of J. Matthews, Fillongley, Coventry.

Competitors are asked to build a simple Meccano model having as its central feature the letter "V." At first this may appear a somewhat difficult task, but a little consideration will show that there are many different types of models in which a "V" design can be incorporated quite easily. For example, there are interesting little gadgets such as pen racks, desk diaries, cycle and motor car mascots, and various household ornaments and kitchen items in which a "V" design can form a prominent part of the construction. In addition there is plenty of scope for building a working model around a "V" theme, and competitors will find it a most interesting pastime thinking out the details of such a model. In addition to the letter "V" competitors may, if they wish, incorporate in their models also the three dots and a dash that represent "V" in the Morse Code.

It will be the degree of ingenuity shown in designing a model, rather than its size or subject, that will decide its chance of winning a prize A large model in which the "V" idea is not readily apparent will not have anything like so good a chance of success as a small and simple structure in which the "V" theme stands out prominently.

The competition is open to readers of all ages and there is no limit to the number of Meccano parts competitors may use in building their models. More than one model may be submitted if desired, but no competitor will be awarded more than one prize.

Actual models must not be sent; a photograph or a good drawing is all that is necessary. This should be sent, together with a brief description of the model, to *"Victory 'V' Model-Building Competition," Meccano Ltd., Binns Road, Liverpool 13.* Entries from readers living in the British Isles must reach Liverpool on or before 31st October; entries from readers living Overseas will be accepted until 31st December.

The following prizes will be awarded to the senders of the models the judges consider to be the most ingenious, bearing in mind the special feature of the Contest. First Prize, Cheque for £2/2/–. Second, Cheque for £1/1/–. Third, Cheque for 10/6. There will be also a number of smaller prizes and consolation awards.

"Birds and Beasts" Model-Building Contest Results

The prize-winners in the Home Section of the *"Birds and Beasts"* Contest, which was announced in our May issue, are as follows:

1st Prize, Cheque for £2/2/–: J. Matthews, Fillongley; 2nd, Cheque for £1/1/–: P. Wickham, Leicester; 3rd, P.O. for 10/6: D. Faulkner, London S.W.1.

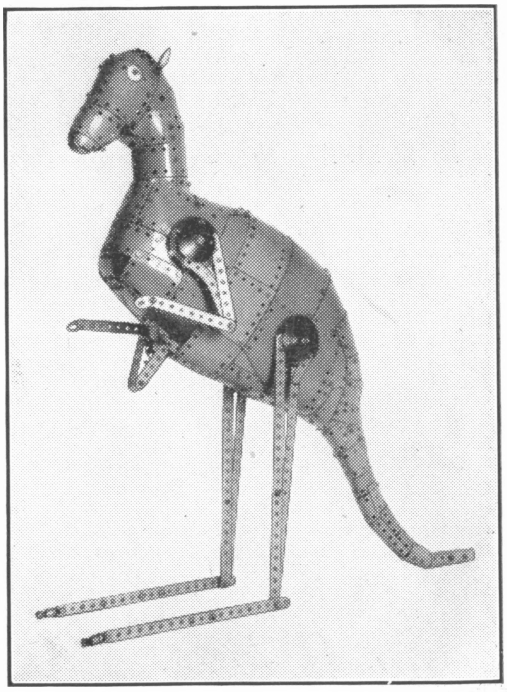
Postal Orders for 5/–: M. MacConaill, Sheffield 10; A. MacConaill, Sheffield 10; R. Slape, Portsmouth.

Many of the models submitted were astonishingly realistic, and in their search for subjects competitors had in some cases delved into the pre-historic ages, representations of such extinct monsters as the mammoth and the sabre-toothed tiger being prominent among the models that received awards. A worthy recipient for the First Prize was found in our old friend J. Matthews, Fillongley, who built the very sturdy and life-like elephant shown in the upper illustration on this page. It was a matter of some difficulty to decide between this fine piece of work and an excellent kangaroo sent by P. Wickham, of Leicester, and it was only after careful summing up of all the difficulties met with and overcome in the construction of both these models that the decision to award the major prize to Matthews was taken.

The interesting feature of the construction of the elephant is the outline obtained with edgings of Strips and Curved Strips, and the careful use of Flexible Plates. The trunk is an excellent piece of work and is attached neatly to the head.

The body of the kangaroo is built up around a framework of Strips and the head is bolted to a Face Plate that is free to pivot on a Rod in the neck, so that the head can be moved from side to side. A "pouch" is fitted to the body and from it projects the head of a baby kangaroo.

Third Prize was awarded to D. P. Faulkner, London S.W.1, who submitted fine models of an eagle and a crocodile. The feathered wings of the eagle are neatly constructed from Flexible Plates, and are bolted to a body built up from Strip and Flexible Plates. The crocodile has a length of 5 ft. and consists mainly of Flexible Plates secured to a framework of Strips. The jaws are built up around $12\frac{1}{2}$" Angle Girders and are neatly filled in with Strips. The feet consist of Strips and Formed Slotted Strips, which are attached to $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates forming the legs.



P. R. Wickham, Leicester, did a fine piece of model-building in constructing this realistic Meccano Kangaroo.

Club and Branch News

Settling the Winter Programme

The programme for the winter will be the first consideration this month. Once more we shall have to contend with blackout conditions and meetings will have to be arranged earlier, and if possible during daylight hours. This should be comparatively easy with the experience of the two previous winters to guide us. As for the programme itself, this is best settled at a general meeting of members, and Leaders and officials should take the earliest opportunity of calling these together for the purpose.

Model-building meetings of course will form the chief feature, and as far as possible these should take the form of competitions, whether members build their models at the meetings or prepare them at home. The usual games and social events must also be included, and to give variety and add interest it is a good idea to introduce "Mystery Programmes." One plan to follow in regard to these is to commission small groups of two or three members to plan "Surprise Nights." The aim of each group responsible for the details of one of these programmes should be to introduce as much novelty as possible. Much of the fun lies in the anticipations of other members as to what they will be called upon to do, and all preparations will be watched by eager eyes.

Youth Takes Charge

My illustration this month is of unusual interest. I have often published photographs of groups of officials of Clubs, but never one composed of members so young as the boys who manage the affairs of the Exeter M.C. This Club is one of long standing. It has been connected officially with the Meccano Guild since 1925, but began much earlier and has been under the inspiring Leadership of Mr. M. C. Hodder since 1920. When it became necessary recently to appoint new officials the Leader determined that youth should be given its chance, and his decision is already bearing fruit. The new officials are keen and intelligent and have settled down seriously to improve Club conditions and to inspire enterprise and initiative in all connected with the Club.

The reports of the Club have told of the astonishing successes of the various football teams associated with it, and this has met with unexpected recognition from the Devon County Football Association, which has forwarded a cheque for £10. Mr. Hodder tells me that a black kitten strolled into the Club room and insisted on becoming a member for the evening, to the great delight of all who were present. It was two days later that the handsome contribution from the Devon County F.A. arrived, and all agreed that they would like the kitten to pay a further visit. There is much more than luck in such recognition, however. It is the enterprising character of its proceedings, characteristic of the Meccano Guild spirit, that has won for the Club its reputation.

The Exeter M.C. is not by any means the only one in which youth is given its chance. Another instance comes from London, where Mr. V. Miller, Leader of the Islington M.C., is so busy with war work that he is unable to attend many of the meetings. Faced with this difficulty he told his members that it was up to them to carry on, and they have risen splendidly to the occasion. Meetings are held as usual, and are wonderfully successful, and those responsible have even started a new Junior section for the benefit of the younger and newer members. The Club indeed provides an outstanding example of the splendid spirit that permeates Meccano Clubs. The Club rooms were destroyed by enemy action and much of the stock was ruined. The members were by no means daunted, however, and by dint of hard work have secured new headquarters and have built up an organisation that promises to be even more successful than it was in pre-war days.

Branches Recently Incorporated

413. LEEDS—Mr. S. Booth, 2, Bk. Addington Street, Dewsbury Road, Leeds 11.

414. ELGIN—Mrs. M. H. Strachan, 23, High Street, Elgin.

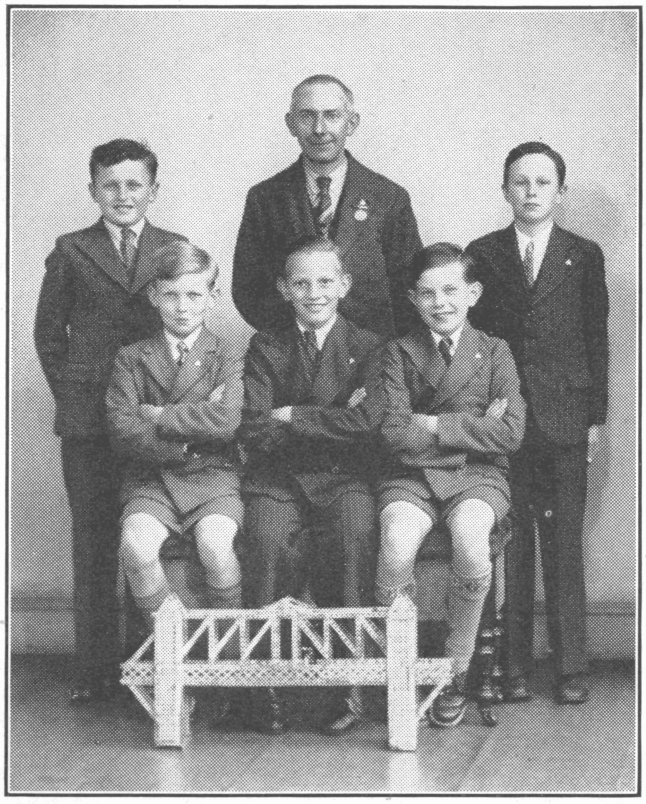
415. MELKSHAM—Mr. R. R. Tomlin, The Beltane School, Shaw Hill, Melksham.

416. SEATON DELAVEL—Mr. J. A. O'Donnell, 104, Astley Road, Seaton Delavel.

417. ROCHDALE—Mr. D. Morgan, 5, Ash Grove, Thornham, Rochdale.

Club Notes

Islington M.C.—The Club has now settled in its new headquarters and recruiting is brisk. Special model-building nights are arranged, members bringing their outfits and constructing models of various kinds. A Junior section has been started. Owing to the absence of Mr. V. Miller, Leader, from some of the meetings owing to war work the Club has been conducted by Senior members, all of whom are keen and efficient. All models constructed are carefully inspected and marks are awarded, these going towards the totals for competitions extending over each session. Other activities include Swimming and Cricket. The Club room is being carefully decorated. Club roll: 14. *Secretary*: G. Gibbs, 57a, Samuel Lewis Flats, London N.1.



Officials of the Exeter M.C., Leader, Mr. M. C. Hodder, who is seen in the middle of the back row. On Mr. Hodder's left is J. Casley, President, and D. Blatchford, Vice-President is on his right. In the front row, from left to right, are C. J. Curry, K. Addicott (secretary) and K. Hole. This Club was affiliated in 1925 and its continued success is due to the inspiring Leadership of Mr. Hodder, who has been in charge ever since affiliation was secured, and the enterprise of members, who are themselves largely responsible for the running of the Club.

Oakfield School (Newquay) M.C.—The Club raised a further sum to be added to the money taken at a recent Exhibition on behalf of the local War Weapons Week. Model aircraft are being constructed, and members have specialised in ingenious fittings such as bomb releases and retractable undercarriages. The Library contains aeroplane books and periodicals in addition to the "*M.M.*" One member has an excellent film projector, and Film Shows are to be given. Club roll: 18. *Secretary:* T. L. Higgins, Bay View Terrace, Newquay, Cornwall.

King Street Library (Stretford) M.C.—Illustrations from the Scrap Book assembled by Miss Carline, Leader, are used as subjects for model-building, and provide great scope for original work. Two of the working models that resulted were a multiple driller and a cable drum, which were explained and demonstrated by their constructors. The summer session came to an end with an Exhibition to which the public were invited. Every member brought a model, and model factories, houses and shops were built for the event. There was a large attendance and the display formed a splendid conclusion to a period of excellent work. Club roll: 35. *Leader:* Miss D. Carline, Stretford Library, King St., Stretford, Manchester.

Totnes M.C.—Meccano models built have included a Meccanograph and an excellent clock. Debates have been held and Treasure Hunts have been enjoyed. In these common articles are hidden and competitors have to find as many as possible in an hour. Prizes in this contest were presented by a friend of the Club. Older members engaged in war work are kept in touch by reports and announcements of forthcoming events. Club roll: 15. *Secretary:* T. J. Macnamara, Gables, Totnes.

AUSTRALIA

Maylands M.C.—Well-attended meetings are being held, and competition in Model-building and other activities is very keen. The Reserve Club also is making good progress. Special models built have included a ship coaler, and a giant six-wheeled lorry with trailer. The Club celebrated its Sixth Birthday by a Social, and the Reserves arranged a similar celebration. *Secretary*: W. Petersen, 1, Warne Street, Maylands, Perth, Western Australia.

Branch News

York.—More Points and a new lever frame have been brought into use. Their introduction has allowed the provision of a siding for wagons. Attention has been given to scenic effects; embankments have been constructed and a factory has been built, Meccano Parts being used in their construction. The baseboard has been strengthened and extended. Members take it in turns to act as point operators, switchboard controllers, engineers, etc. and running is carried out with great regularity in order to ensure that the layout and rolling stock are always in good order. A campaign to reduce accidents has been started. *Secretary:* G. A. Hodgson, 1, Sunnyside, Heslington Lane, Fulford, York.

Monkstown (Co. Dublin).—New material has been acquired and this has made extensions and new timetables necessary. A baseboard is to be erected on which to lay the Branch track. At one meeting all stock was cleaned and overhauled, the result being greatly improved performance. Visits have been paid to the G.S.R. and G.N.R. works, at Inchicore and Dundalk respectively. Cycle runs have been arranged to various places, along with "Mystery Tours." *Secretary:* R. D. Pierce, 20, Monkstown Road, Monkstown, Co. Dublin.

Acton.—Headquarters have been reopened for track meetings. Members have cleaned and overhauled all material, and the baseboard for the new layout has been completed. The existing track is to be continued until after the war, when the new one already planned will be brought into use. Constructional work on this continues. Both electric and clockwork trains have been operated on a Hornby Dublo layout contributed by three members. Indoor games have included Bagatelle, Skittles and Ring-board. A Lecture has been given by E. Gurney on "*L.M.S. Locomotives.*" In a Model-building Competition of special interest members were asked to construct Meccano miniatures of locomotives. *Secretary:* S. W. Simmons, 37, Derwentwater Road, Acton, London, W.3.

Beltane School (Melksham).—Experimental tracks were laid down and operated in order to discover the most suitable layout. This has now been settled, and timetables have been prepared. Goods and passenger trains are run at regular intervals, and the number in operation is gradually being increased. Further developments to the layout are being planned and tried in practice. *Secretary:* M. Bredon, Beltane School, Shaw Hill, Nr. Melksham, Wilts.

Hornsea.—Electrification has been completed by the Senior enthusiasts. A goods yard has been illuminated and the electric signals finished. Special features are made of miniatures of troop trains and other specials conveying munitions and other wartime army requirements. A Woodwork Section has been formed for the special purpose of making stations and scenery. *Secretary:* D. Parker, 8, Burton Road, Hornsea.

Martinwhite (Guildford).—Excellent progress has been made, members attending regularly. The Dublo track is very popular, and a lengthy Gauge 0 track also has been arranged outdoors. Solid steel track has been introduced. An interesting enquiry followed a crash in which the miniature "*Royal Scot*" was concerned. At one meeting a microphone was placed in the control room and connected to a loudspeaker in the train room. These were used for giving running instructions. *Secretary:* T. M. White, Bingham Stoke Road, Guildford.

Folkestone.—The new Hornby Dublo railway is now taking shape, and two new stations have been completed. A new timetable has been made out for use on it, boat trains now being excluded. Branch working and shunting have been practised. *Secretary:* F. E. Saunders, 79, Dover Road, Folkestone.

Electric Signalling on Hornby-Dublo Railways

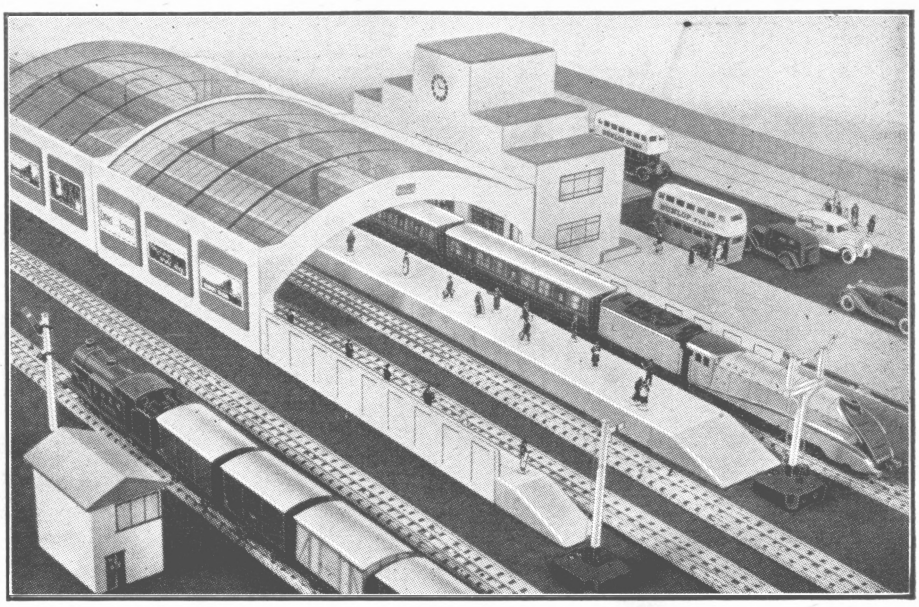
MOST of us, on occasions when our train has been halted opposite a signal cabin, have watched the signalman at work, and thought how fascinating it must be to control trains as he does. All the thrill of operating signals and controlling trains is made possible—without any of the hard work attached to the real job!—by means of the Electrically-Operated Signals of the Hornby-Dublo system. The design of these signals is based on the upper-quadrant signals on most British main lines, and three types are available.

There is the ordinary Single-Arm Signal, available with either a "home" or a "distant" semaphore. The "home" semaphore is coloured red on the side that faces the driver approaching it, and it has a white stripe near its outer end, which is square. When the arm is in the horizontal or "danger" position it forms a definite "stop" indication. The "home" type of signal therefore is used at or near the platform ends of a station to control incoming and outgoing trains. It is also used in sidings to govern the starting of trains that may be held in them.

The "distant" signal is similar in having a single arm, but the side of this facing the driver is coloured yellow. Near its outer end there is a black V-shaped stripe that corresponds to the V-shaped or "fishtail" notch cut in the outer end. The "distant" signal is really a warning signal, and is placed a good distance in advance of the home signal. If the "distant" shows "line clear," then the "home" signal will show "line clear" also; but if the "distant" arm is in the horizontal position, indicating "caution," the driver knows that the home signal is at "danger"; and he must reduce speed in order to be able to stop when he reaches it, if it should still be at "danger."

In busy areas where the distance between successive "home" signals may be too short to allow of a "distant" signal being positioned at the minimum of 600 yds., or so in advance of its "home" signal, the "distant" semaphore is often mounted on the same post as the preceding "home" one. The result is a combined "home and distant" signal, which is represented in the Dublo System by the Double Arm Signal, the distant arm being always placed below the "home" arm and never showing "line clear" unless the "home" arm does so too.

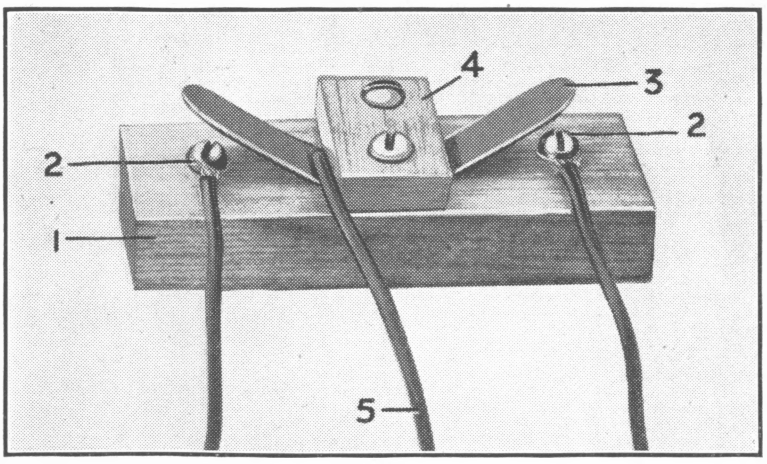
Facing points leading to sidings or loop lines, or forming part of actual main line junctions, require the special Hornby-Dublo Junction Signal. This consists of two dwarf signal posts or "dolls," each with its own semaphore, mounted on a cross member supported centrally by a main post. This type of Signal is made with either "home" or "distant" semaphores.



A Hornby-Dublo station layout, showing electrically operated signals in use.

The mechanism of Hornby-Dublo Electrically-operated Signals is housed in a neat casing forming the base of the Signal. The Signals work from the same Transformer that supplies current to the track for the trains. Any number of signals may be connected to one Transformer, but no more than four semaphores should be operated at the same time.

Normally the electrically-operated signals are controlled by means of the special Dublo Switch D1. As the result of war conditions, these Switches are not at present available, but fortunately it is possible to make a temporary substitute in a very simple way. The Dublo signal movements require current only during the time they are in operation; when they are at rest the current is switched off. For instance, if a Dublo signal arm is at "danger," and it is required to move it to the "clear" position, current must be applied to the signal in such a manner that movement of the arm to the required position results. Then, immediately the movement is completed, the current must be switched off. Leaving the current on during the periods of rest would not only be wasteful, but also would quickly result in damage to the windings through overheating. The Dublo D1 Switch prevents such overheating by automatically switching itself off on completion of the movement of the Switch lever from one position to the other. The substitute switch that we are now going to describe has not an automatic arrangement of this kind, but it operates on the "push button" principle, in which current passes only when a contact strip is pressed down.



The illustration shows the simple design of the switch. Its construction may be varied as desired, so long as the main features are retained. The materials required are two small pieces of wood, four wood screws which, if possible, should be brass, which does not tarnish, and a strip of springy brass. For this strip the longer contact strip of a worn-out flashlamp refill of the flat type is just right. The base is a piece of wood 1, about $\frac{1}{4}$ in. thick, $\frac{3}{4}$ in. wide and $1\frac{3}{4}$ in. long. In this are screwed two wood screws 2, spaced $1\frac{1}{4}$ in. apart. The contact strip 3 is then placed along the centre line of the base and fixed in place by a second piece of wood 4, as shown. Before this piece of wood is finally screwed down, the bared end of a piece of insulated wire 5 is placed between the strip and the wood. The ends of the strip are now bent upward so that in their normal positions they do not make contact with the screw heads 2. When either end is pressed down with a finger so that it touches its contact screw, the appropriate electric circuit is closed. The signal arm completes its movement, the finger is removed, and the current is switched off.

A Picturesque Layout at Windsor

The "Rockery Railway"

THE layout shown in the illustrations on this page has been developed by our reader H. A. Hunt of Windsor, from whom we received the photographs and notes on which this article is based. The system as it is at the moment is a good example of a railway that is used indoors during the winter months but can be transferred outside when the weather is fine.

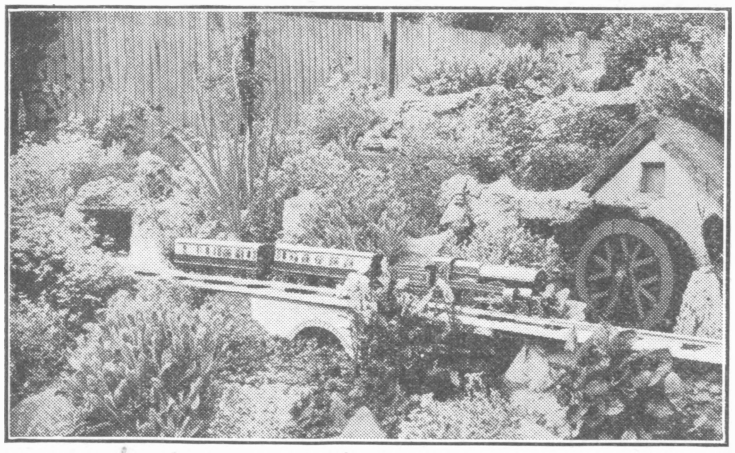
Originally the railway was laid down in a loft, and in the winter it is still housed there. Tinplate rails are used, and traffic is operated by Hornby clockwork locomotives. After a time it was felt that it would be better in the summer to be able to play out in the sunshine rather than under the electric light necessarily used in the loft. At first boards were laid on the lawn to form a foundation for the track. There was some difficulty in obtaining a good level, however, and another point was that, owing to the extent of the railway, a great deal of time was required to lay down the track and take it up again when finished with. It was therefore decided to construct a permanent level runway on which the track could be speedily laid down. A plan of the layout is kept on which details are given of the various rails required on each section, and assembly is thus an easy matter.

The rockery was chosen for the site, and apart from the scenic character of the "country" served by the line there was added interest in the "engineering operations" necessary in order to secure a level run. In some places the rockery had to be built up, elsewhere tunnels were necessary to carry the line through "high ground"; while at certain points bridges had to be provided to span various gaps.

The railway consists of a single main line that makes a complete circuit of the rockery and has a terminus station and extensive sidings connected to it. Alternatively the station can be arranged on the main line and a double track section laid down to serve it. An advantage of this scheme is that trains can be run in either direction, and a service maintained without the engines requiring to be reversed or turned on the turntable included in the terminal sidings. With this arrangement, however, it is not possible for station platforms to be placed on both sides of the line owing to lack of space, for the station site is approximately 8 ft. long by 4 ft. 3 in. wide.

The place selected for the terminus was at first a heap of earth excavated from the air raid shelter. The heap was squared up and levelled off, and the sides were encased in a wall built of old bricks. A layer of cement was then put down and a regular flat space thus obtained on which the station and its sidings could be accommodated.

The lower illustration shows a most effective scene on the line where the track passes a miniature water mill. This is rather large in proportion to the scale of the railway, but this is because the mill itself was in existence before the railway. The mill wheel is turned by the several tiny streams that flow down the rockery at various points. Water is drawn from a small pool in the rock garden by an electric pump, which works also a fountain erected in the middle of the pool. The water flows down the rockery back to the pool and is thus used over and over again, so avoiding waste.

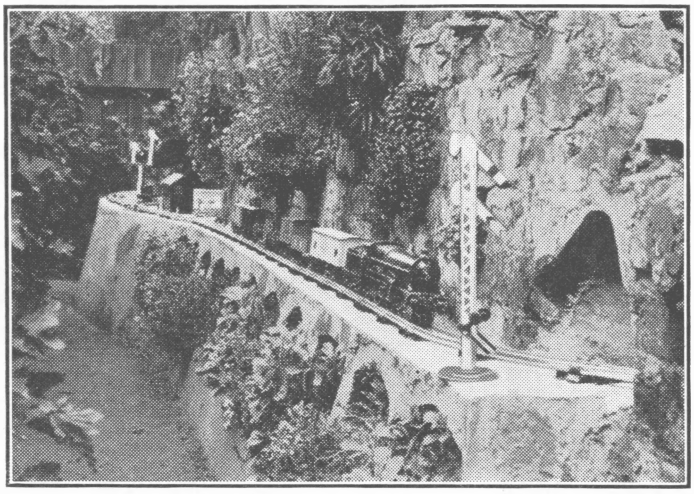


A picturesque view on the "Rockery Railway" of H. A. Hunt, Windsor. The G.W.R. express is passing a miniature water mill situated in admirable natural scenery.

The same illustration shows also a typical point in which the construction of the line has been planned and carried out to interfere as little as possible with the natural beauties of the garden. This section of the line, and certain others, are laid on strips of asbestos sheeting, which are removable when the railway is not in use. When in position they are supported on concrete pillars designed to harmonise with the general appearance of the rockery.

One of the tunnels on the line leads to the rockery section. Immediately afterwards the railway crosses a dip in the ground by means of a small bridge. In making forms for the bridge arches and the concrete work generally it was found that stout cardboard bent and shaped as required was sufficient to hold the cement mixture in place until it set.

Another tunnel leads off from what is termed the "Long Viaduct" to the front of the rockery. The "Long Viaduct" runs along the back of the rockery. It consists of numerous arches open at the front only, the structure being backed by the actual rockery. To a certain extent this section of the line, which is shown in the upper illustration, resembles the Dawlish and Teignmouth section of the G.W.R. South Devon main line where the railway runs literally on a ledge partly cut and partly built up by the sea edge. There is no sea on the miniature railway, however.



The "Long Viaduct," an interesting engineering feature on the layout described on this page. The Viaduct consists of a series of arches constructed in concrete and runs along the back of the rockery.

Both passenger and goods trains are operated, and pride of place is held by the express train formed of Hornby No. 2 Corridor Coaches and hauled by a No. 3C *"Caerphilly Castle"* locomotive. This makes a splendid representation of the *"Cornish Riviera Limited"* or *"Torbay Express"* of normal times. The same engine is used also for dealing with important or heavy goods trains, and it is seen so engaged in the "Long Viaduct" illustration.

Less important work is done by a Hornby No. 1 tender locomotive, which thus takes the place in miniature of the G.W.R. mixed traffic or general purpose engines. Local train and shunting work is performed by a Hornby No. 1 Tank. Goods rolling stock is varied in type but G.W.R. and S.R. material predominates. There are open and Lumber Wagons, Covered Vans including a No. 2 Luggage Van which well represents the big bogie vans popular on the G.W.R. There is also a Trolley Wagon that makes a good G.W.R. "Crocodile" in miniature. This is usually loaded with a couple of Cable Drums, but is available for any exceptional load.

In conclusion the owner and Engineer of the "Rockery Railway" remarks that the actual cost of construction was small, the fullest advantage being taken of the natural site for the line.

ALL KING GEORGE VI—FINE USED

30	different;	20	large	and	10	small	for	1/3
40	,,	25	,,	,,	15	,,	,,	1/9
50	,,	30	,,	,,	20	,,	,,	2/3
70	,,	40	,,	,,	30	,,	,,	3/6
80	,,	45	,,	,,	35	,,	,,	4/4

45 different. All large stamps for 2/9.
Bargain packets containing no Great Britain.
Postage 2½d. extra if not with approvals.

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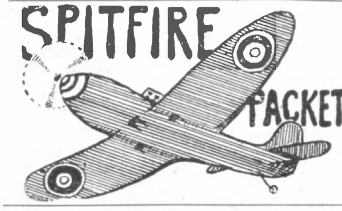
THE BIRKDALE STAMP CO.

wishes to announce that the business will be closed from September 8th to 20th for holidays, etc., after which all customers, old and new, will receive the promptest possible attention.

THE BIRKDALE STAMP CO. (P.T.S.)
104, LIVERPOOL ROAD, SOUTHPORT



PACKET contains 38 air, triangular, and stamps with aeroplanes on, etc.—2 LIBERIA triangular (with aeroplane), usually sold at 7d.; NIGERIA (George VI); COSTA-RICA (Large Air Post); URUGUAY; INDIA (large); ROUMANIA (Carol); 8 CANADA (a fine set including large pictorial); 2 TANGANYIKA; 3 PALESTINE (pictorials); 6 BRAZIL (including airpost and aeroplane design); 5 U.S.A. (obsolete); 2 JAVA, COSTA-RICA (Diamond Shape, very beautiful) and MOROCCO, LARGE PICTORIAL; Peru (obsolete); GERMANY (airpost); COCHIN (large) and IRAQ—Price 5½d., postage 2½d. extra, abroad 3½d. extra. Money back if you are not satisfied. Applicants for approvals receive 6 Pictorial S. AFRICA and in addition, those sending addresses of stamp collecting friends get an additional set of 4 GEORGIA. FOR EVERY PACKET SOLD I AM GIVING THE PROFIT TO THE "SPITFIRE FUND," SO YOU WILL BE HELPING TO WIN THE WAR. **BARGAINS**—100 B. Colonials 1/-; 8 Triangular 7d.; 18 Georgia 10d.; 20 Rhodesia 1/2; 14 new Geo. VI 1/2.

H. C. WATKINS, Stamp Importer (M.M. Dept.), Granville Road, BARNET

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12-page book on approval: Br. Colonials and Foreign from ½d. to 5/- each. Please state whether beginner, medium or advanced.

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Apply now for our packet of interesting and topical stamps from these vital countries. FREE to all applicants for our renowned Approval Sheets sending 3d. to cover cost of postage. Offer is for 30 days.

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Grand British Colonial Pictorial Commemorative Collection to all collectors asking for my fine "Modern Approvals" and sending 3d. postage. No rubbish sent. Prompt replies. Lists of over 1,000 different British Colonial Packets 1/- to £5, and illustrated priced catalogues. **NEW SEASON'S BARGAIN OFFERS** (all prices postage extra): **Mozambique Co.**, grand collection 100 different including beautiful Pictorials, Triangulars, lots of Elephants, Airs, etc., **catalogued about £5, for only 10/6**; **Gwalior**, grand collection 20 different all obsolete 1/-; **Great Britain**, the scarce K.G.VI 2/6 and 5/- superb used for 2/-; **Nicaragua**, all obsolete collection including large Arms, scarce Overprints, etc., 16 different, cat. 17/2, a gift at 1/6.

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HOSPITAL STAMPS

75 Different Foreign and Colonial Stamps selected from Collections presented to Hospital. Send 6d. and stamped addressed envelope to:

SECRETARY, Memorial Hospital Hall, Woolwich, LONDON S.E.18

An approval sheet from our limited number will be sent on request.

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	S. G. Numbers. FRED HARLOW'S PRICES
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1d. each	147. 148, 256, 259, 265, 268, 278, 281, 291, 293, 301, 302, 306, 308, 309, 310, 311, 312, 330, 333, 344a, 346a, 359a, 360a, 362, 368, 372, 372a, 373, 373a, 383, 386a, 387, 387a, 389.
2d. each	187, 196, 245, 257, 283, 313, 318, 331, 332, 344, 347a, 348a, 357, 361, 390, 391, 392.
3d. each	122. 205, 285, 294, 316, 320, 321, 346, 347, 376, 377, 384, 393.
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Free Gift! Scarce Belgian Charity Issue to all genuine applicants for approvals enclosing postage. R. Waterall, Philatelist, Glendene, Grindleford, Sheffield.

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(British 1840 Penny Black) for P.O. **4/6!** It is guaranteed genuine in every respect. Its companion stamp (1840 2d. blue) for a further **7/6** (cat. 17/6)! Other "Classics" which every collector should have are the **Cape of Good Hope Triangulars**; we offer 1d. rose (cat. 40/-) for **12/6**; 4d. blue (cat. 15/-) for **5/-**; and 6d. pale lilac (cat. 40/-) at **15/-**. Superb approvals of any country against approved English References or a deposit. **Full Lists Free.**

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This scarce high value stamp will be given free to all genuine applicants for our famous ONE PENNY Approval BOOKLETS of BRITISH COLONIALS. These Booklets abound with JUBILEES, CORONATIONS, large BI-COLOURED PICTORIALS and the latest King George VI stamps. The best value on the market and every stamp an investment. N.B.—Enclose 2½d. for Postage.

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Catalogued 2/6, 6/—penny each! Appro. 3d. post. J. Baguley, Westoncolville, Cambs.

For other stamp advertisements see page viii

STAMP COLLECTING

War Stamps of the Allies—Russia

FEW features of this amazing war have been quite so sensational as the sudden Nazi attack on Soviet Russia. We are not concerned with the reasons for this attack, but with the war stamps of our new ally. There have been many wars in Russia's history, but prior to the 1917 revolution the design of the country's stamps consisted almost solely of the Imperial Russian Arms, and there was only one that could be described as a war stamp. This was a Charity series issued in 1905 to raise funds to aid the widows and orphans of Russian soldiers killed in the Russo-Japanese war. A surtax of 3 kopeks was levied for this purpose on each stamp in the series. Thus for example the full cost of the 3 kopeks stamp in the issue was 6 kopeks. Specimens from this series are priced in the catalogues at 2/6, 3/6 and upwards, which makes them a little costly for the average boy collector. The designs include a view of the memorial at Sebastopol to Admiral Kornilof, Russian naval commander in the Crimean War between Russia and Britain. This is on the 3 kopeks value and, for those who can obtain a copy, it would serve to illustrate two of Russia's wars during the Imperial regime.

The most important of all events in Russian history was the revolution that came towards the end of the European War of 1914-18. When the Kerensky government was formed in 1917, a stamp showing a sword cutting fetters was issued. This is illustrated in the bottom right hand corner of this page. It did not appear until later in the year, by which time the revolution had culminated in the success of the Bolshevik party under the leadership of Lenin. The portrait of this great leader appears on the mourning stamp issued on his death in 1924, and it was subsequently to be seen on stamps issued at various times, notably on stamps issued in 1925-6, and in 1927-8, while the Lenin Mausoleum in Moscow figures on other stamps. These stamps could well be included in our collection, for Lenin was the inspired leader of the new Russia in the fierce civil warfare that followed the Revolution.

A typical Russian soldier of this period is shown on various stamps issued during 1922 and 1923, and the specimen reproduced on page 296, the 70 r. value of the December 1922 issue, will serve to illustrate this stage of our story. The design appeared on three stamps of this set of four, the 10 r. value showing a typical Russian workman. These stamps were imperforate, but a perforated issue appeared in the following year.

The commemorative stamps issued in 1927 and 1928 to celebrate the 10th anniversary of the Revolution and the founding of the Red Army also can be used to illustrate this period. These included many designs of great interest. The 8 k. value of the 1927 series commemorating the 10th anniversary of the Revolution shows a sailor of the Russian Navy and a workman bearing arms, while the 3 k. and 28 k. values picture a workman, a soldier and a peasant together. The Smolny Institute, Leningrad, the headquarters of the Bolsheviks during the earliest days of the Revolution, figures on the 7 k. value, and an allegorical design entitled "Revolution" appears on the 5 k. value, while other designs symbolise the federation of the various republics that make up the U.S.S.R. One of these shows a map of Russia in Europe and Asia, and indicates the huge extent of the country. The four designs of the Red Army set of 1928, commemorating its 10th birthday, show an infantryman standing on guard at the Lenin Memorial in Moscow (8 k.), a Red sailor with a cruiser in the background (14 k.), a cavalryman (18 k.) and an airman (28 k.) respectively.

Further commemoratives referring back to the same period came in 1929 and 1930. A guardsman of the Soviet Guards is shown on two values of the October 1929 issue, and a very interesting set of designs was used in the 1930 series commemorating the 10th anniversary of the formation of the first Red Cavalry units. These were the successors of the famous Cossack regiments of the former Imperial Army, and indeed they were largely made up of men from those regiments. The most striking of the four designs in this series is the 5 k. value, showing a cavalry charge.

In December 1930 three stamps were issued to commemorate the 25th anniversary of the unsuccessful rising of 1905. The design of the 3 k. value, illustrated here, shows the old Russian cruiser *"Potemkin,"* the crew of which took a prominent part in the attempt. The other designs show scenes at the barricades thrown up by the revolutionaries.

Since the revolution the Union of Soviet Socialist Republics has been undergoing an industrial and economic revolution that might almost be described as a war against dependency on other countries for vital supplies. The famous "Five Year Plans" were wars to gain industrial and agricultural independence, and thus it would not be inappropriate to include among the illustrations of this story some of the many striking industrial designs that have been shown on Russian stamps in recent years.

Industry and agriculture provided the themes of stamps as early as 1921, and on page 296 we illustrate a 10,000 r. stamp, one of two designs used on a series of stamps that appeared in 1922. This is expressive of Russian industry. The design of the second stamp is concerned with both industry and agriculture and reproduces one used in the previous year. In 1929 came an Industrial Loan Propaganda set with more striking designs showing views of tractors at work on a farm, an engineer at work and a blast furnace in operation. One of these stamps illustrate graphically the rising output of pig-iron.

In our next issue we shall continue our story of Russia's war stamps and we shall illustrate some of the interesting designs issued to illustrate the strength of her armed forces and to depict the horrors of war.

New Collectors' Corner

Starting to Collect

September is usually considered the opening month of the stamp season. The new editions of the annual catalogues then make their appearance and dealers vie with one another to make more and more attractive offers to attract new customers. This month therefore we offer a few general points of guidance to those about to start collecting.

To every beginner the stamp is the thing; he prefers to spend every possible penny on stamps rather than on equipment. But certain equipment is essential and first the album must be considered. The fixed-leaf album looks very attractive, with its maps and illustrations on stamps scattered through its pages. It has the great disadvantage however that it provides space for every country, and as few boys can hope to make a good show of all these countries many pages of the album will be left in a very uninteresting state or entirely blank. The loose-leaf album costs a little more but it is well worth the extra, for its pages can be used for the countries of which the collector has specimens available.

Next the method of mounting demands attention. Proper hinges must be used; above all, stamp edging must be avoided. Good mounts that can be peeled away from the stamps at any time to permit remounting cost only a penny or two more per thousand than cheap "sticky" mounts that refuse to part company with either stamp or album page once they have been fixed to them. One or two stamps torn as the result of using cheap mounts dispel all idea of economy in this direction. One point must be borne in mind. No attempt should be made to remove a hinge from a stamp or an album page until it is completely dry. If a mistake is made in mounting, the stamp should be left in its wrong position until the moisture has quite dried away.

A catalogue also should be acquired. Without the guidance it provides, the new collector cannot hope to arrange his stamps correctly, and he may not even be able to identify the country from which some of his stamps have come.

Armed with this essential equipment the beginner can turn to his stamps, and next month we will deal with the important question of what he should collect.

Stamp Gossip

and Notes on New Issues

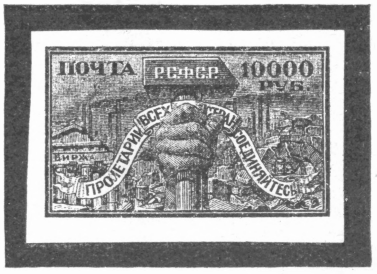
Swiss Airmail Issues

We illustrate this month two stamps of the new Swiss airmail series. The complete series comprises seven values, ranging from 30 c. to 5 fr. in value, each bearing a delightful view of typical Swiss scenery with an aeroplane in flight above.

A small quantity of the 1 fr. value have been overprinted "Pro Aero 28-V-1941" for use on special flights.

A special Agricultural Propaganda issue, consisting of a 10 c. value, appeared on 21st March and also is illustrated here. This bears a picture of a farmer ploughing, to stress the importance of stimulating agricultural production during the present crisis.

Liechtenstein has issued an agricultural series for a similar purpose. This consists of five stamps with designs as follows: 10 rappen, harvesting maize; 20 r., winepress: 30 r., man with scythe; 50 r., dairymaid and cow; 90 r., girl in national costume as worn in rural districts.



"M.M." Stamp and Airmail Forecasts

In recent years the "*M.M.*" has built up a reputation for the correctness of its forecasts. The Magazine has now achieved another success by foretelling the advent of new British stamps in a lighter shade as a war economy measure to conserve supplies of dyestuffs. Readers will remember that we warned them that such a step was probable as far back as last May, long before the Postmaster-General's announcement of the impending change. In turn each of the low value British stamps will appear in lighter dress, but at the moment of writing only the 1d. and 2½d. values have been issued in new shades, the former on 11th August and the latter on 21st July.

Just over 10 years ago we told our readers to watch for the coming of a post box that would stamp letters on inserting a coin. That machine, known as the "Mailomat" arrived in the United States last year. Another forecast was the coming of the day when all first-class mail would be carried by air without additional cost over prevailing surface mail costs. We are still awaiting the fulfilment of yet another forecast. In 1929 we expressed the belief that before many years had passed it would be possible to post a letter for New York in London in the early morning and receive a reply by airmail late the same evening. American bombers are now being flown across the Atlantic in eight hours to-day and it is certain that there will be a terrific speeding-up of transatlantic communications after the war.

Smaller Stamps for India

War economy is making its necessities strongly felt among British Empire issues. The latest news of economy measures comes from India, where it is proposed to re-issue the existing pictorial series in a smaller size as present stocks are exhausted. The object is to conserve the stocks of specially gummed paper used for India's stamps.

We take the opportunity to illustrate the recent new value, 1 a. 3 pies, in the Emperor's Head design, also the new 1 p. value from Burma. Both of these were printed in India and have only just come to hand, although they were issued a month or two ago.

"Philately"

A reader has asked us how the word "philately" should be pronounced. We have heard experienced philatelists pronounce it in many different ways, but the pronunciation commonly used is that given in Chambers' and other standard dictionaries—fi-lat-e-li, with the accent on the second syllable.

* * * *

Readers who intend to buy a new catalogue **this month should** place their orders **without delay.** The quantity to be printed is much less than in normal times and, in fact, to meet the necessity for paper economy, Stanley Gibbons Ltd. are **producing only** new editions of their "Simplified" Catalogue and the "British Empire" section of the "big" catalogue. There will be no "Foreign" or "Whole World" edition for the present year.

* * * *

The "Free French" Cameroons are reported to have issued the French Colonial World's Fair stamps, originally issued in May 1939, with a new overprint "Spitfire 10 fr.—General de Gaulle," the proceeds of the premium being in aid of War Weapons for the Free French Forces. The stamps were placed on sale in March last and, it is understood, were sold out within two or three days. Clearly this is going to be another war issue that collectors will find difficult to obtain.

We thank David Field Ltd., 7, Vigo St., London W.1, for their courtesy in loaning the stamps from which the illustrations for our stamp pages have been made.

From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

"Sixpenny Handley"

Many readers must have noticed curiously abbreviated place names on sign-posts and milestones in the West Country. Few however will dispute that the most curious of such paint-savers is that on a sign-post near Blandford, which points to "6d. Handley."

The origin of this name is interesting. In past times the district was divided into two "hundreds," one of which was named "Sexpena" and the other "Henlega." These eventually became merged to form "Sixpenny Handley," and the accompanying photograph shows what the sign-writer has made of it.

L. F. BERRY (London S.W.17).

A strange signpost indication in Dorset. Photograph by L. F. Berry, London S.W.17.

The Edge Hill Light Railway

Prior to the war I visited the now derelict Edge Hill Light Railway in South Warwickshire. The railway runs from a point near the village of Ratley, at the top of Edge Hill, to Burton Dassett goods yard at the bottom, where it joins the Stratford and Midland Junction line of the L.M.S. Its total length is about 3 miles.

Most of the rails are of the flat-bottomed type, spiked directly to the sleepers. They are rusty after 16 years of idleness, however, and the sleepers are decayed. In 1925, when the line was closed after only a few year's service, the men working on it were told to stop, so apparently they all "downed tools" and went home, leaving everything as it was when they gave up. The railway unfortunately has never been touched since, except for the "removal" of wheel-barrows and other small easily-removable material.

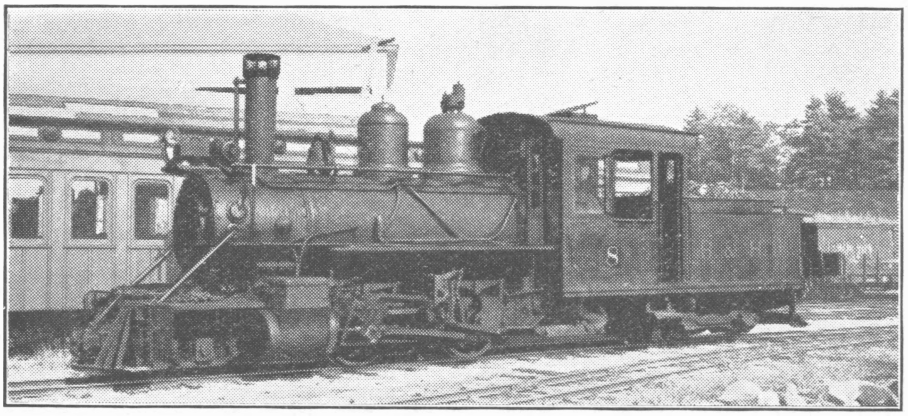
I saw three engines lying on this line—two Brighton 0–6–0 "Terriers" at the bottom and an old cabless 0–4–0 saddle tank under the road bridge at the top of the hill. There were also some wagons, which had fallen to pieces with age, and one or two brake vans. The 0–4–0 tank which is called "*Sankey*" was built by Manning Wardle Ltd. and once bore two makers' plates giving this information, but these have been removed, possibly by souvenir hunters. An interesting feature of the "Terriers" was that beneath the lettering E.H.L.R. the original L.B.S.C.R. of the former London, Brighton and South Coast Railway could be distinguished.

The purpose of the line was the conveyance of iron ore and it has been suggested that it could be repaired and used again for the same purpose. The cost of this would probably be nearly as high as that of building a new railway.

There is a steep incline on the railway which was worked on a system whereby the loaded wagons pulled the empty wagons up the hill. P. A. NORTON (Coventry).

An American Narrow Gauge Locomotive

The locomotive shown in the accompanying photograph is one of the two remaining steam engines of the Bridgton and Harrison Railway, a 2-ft. gauge line approximately 16 miles long in Maine, U.S.A. Its massive proportions are evident and it is interesting to compare the locomotive with those running on the Festiniog and other British lines of similar gauge.



A 2-4-4 tank locomotive of the Bridgton and Harrison Railway, a 2-ft. gauge line in Maine, in the United States. This line is one of two of this gauge now remaining in the U.S.A.

The engine was built in 1924 at the Baldwin Locomotive Works. It weighs 40 tons and has outside frames, with an electric headlight and generator on top of the smoke-box. An engine of somewhat similar type by the same builders ran for a time on the 2 ft. gauge Barnstaple and Lynmouth Railway, which was abandoned some few years ago after absorption by the Southern Railway.

The photograph is of particular interest in view of the fact that the Bridgton and Harrison Railway is one of the two remaining 2-ft. gauge lines in America. It may have to close down in the near future owing to road competition and to lack of traffic, although strenuous efforts are being made to keep it running.

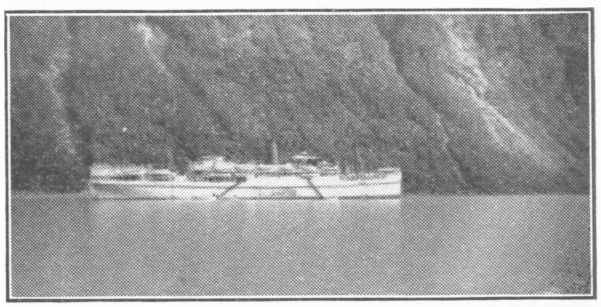
H. E. MEATS (Birmingham 24).

The Sogne Fjord

Whilst spending a holiday in Norway I visited the Sogne Fjord, one of the longest in the country. From start to finish of the journey up the Fjord I was greatly impressed by the height of the beautiful pine-covered slopes stretching up on either side of us. In the few places where the slopes did not rise sheer out of the water, but left a kind of shelf, small pretty hamlets had been built, each with its own small spired church.

At the head of the Fjord our ship anchored off a village called Fjärland. The place and the surrounding scenery were so delightful that the name was soon adapted to "Fairyland." The village was rather more than half a mile from the actual head of the Fjord. Walking round this we discovered a disused water-mill, which in days gone by had been worked by one of the many streams that rush down the slopes to tumble into the waters of the Fjord. Although in disuse, certain parts of the mill were workable, and we managed to get the old grindstone going well enough to sharpen our penknives.

The following morning we walked about four miles to see a glacier, the melted ice of which ran into the Fjord. Although the glacier made a very chilly impression on us, there was a hut only about 30 yards away where ice-cream was being sold!



Near the head of the Sogne Fjord, which penetrates over 100 miles into the mountainous country of Norway. Photograph by J. W. Simpson, Chingford.

The anchor was raised after dusk, and as we passed down the Fjord I watched the twinkle of village lights gliding by.

J. W. SIMPSON (Chingford).

Naval Guns and Gunnery

(Continued from page 271)

high up in the ship. The Director is trained on the selected target and its sights are adjusted to the range from the range-finder, and to the estimated deflection derived from the estimated course and speed of the enemy. These bearings, ranges and deflections are obtained from a preliminary "plot," and are mechanically transmitted to the guns.

The "gun layers" and "trainers" keep their marks exactly on those transmitted from the Director, and the guns thus correctly laid and trained on the target. When the bugle sounds the "commence-fire" the opening salvo is fired, and the ship reels under the tremendous recoil as, in a battleship, four to five tons are hurled simultaneously at 2,000 m.p.h. from the broad-side.

The "spotting officer" watches through his glasses for the "fall of shot" revealed, perhaps half a minute later, by four great columns of water. If all these four columns of water obscure the target he knows that he is correct for "deflection," that is for direction, but "short" for range; and he orders "Up 800 yards." The sights are raised by this amount and another salvo is fired' "Short" again, "Up another 800." This time they all fall "over," as is spotted by the fact that in this salvo the target is obscured by no columns of spray. "Down 400" is the spotting officer's next order.

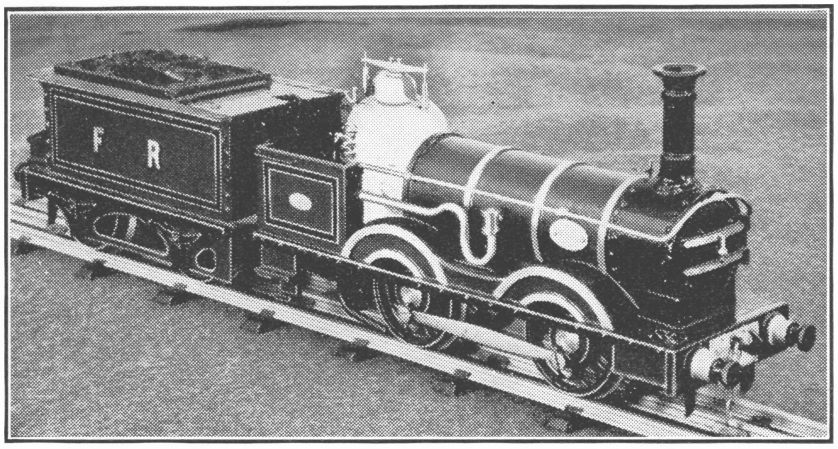
Perhaps this time two columns of spray obscure the target, one is seen to fall over, and one splash is changed into a red glow and a column of smoke—as when the *"Bismarck"* was hit by the *"Prince of Wales,"* or the *"Scharnhorst"* by the *"Renown,"* off the coast of Norway. A *"straddle"* has been obtained, and the rate of fire is now increased so that sometimes two salvos may be in the air at the same time. The "straddle" was obtained by "bracketing," and a high rate of fire will be maintained until all shots are again spotted to be "over" or "short," when bracketing will be again undertaken until a straddle is again secured. So the firing is continued.

In an action between two opposing and well-fought ships the fight is likely to be one involving gradual and mutual destruction of both ships, the victory finally going to the crew that can stand the mental strain longest, or to the best protected ship. I think the most nerve-racking moment in a naval battle is probably when the opening flashes from the enemy's guns are seen for the first time, and in cold blood you have to wait for the great shells hurtling towards you. Where will they strike? The water or the ship? When hitting is established, the explosion of a shell is probably mistaken by those far from the spot for the concussion of their own guns. In the neighbourhood, however, the rush of the "fire-parties," the sudden silence, perhaps, of the nearby turret, and the groans of the wounded, tell the tale. When the *"Warspite"* poured her 15 in. salvos into the three Italian cruisers in the battle of Matapan, at close range and in the dark, the doomed Italian cruisers must instantly have become raging infernoes.

Many naval officers have for a long time advocated numbers of smaller ships rather than a few very large ones, so that two or more can engage one. In such an action, one of the two or more ships is likely to be left disengaged, with great advantage to her own firing. This happened when the 6 in. gun cruisers *"Ajax"* and *"Achilles"* chased the battleship *"Graf Spee"* into Montevideo, from which she only emerged to scuttle herself.

In the final attack on the *"Bismarck,"* the 8 in. gun cruiser *"Dorsetshire"* battered the enemy at 19,000 yds. while the *"Rodney"* and *"King George V"* pounded her on the other side. Though all the *"Bismarck's"* guns were in action, and though the German gunners were skilled and courageous, neither the *"Rodney,"* the *"King George V,"* nor the *"Dorsetshire"* were hit. This is a good example of the advantage of numbers.

Bombs, torpedoes and mines have taken a heavy toll of our weaker ships in this war, and all three are formidable weapons. But at sea the gun, from the 16 in. to the 4 in., remains the master weapon.



A fine model of a Bury "Coppernob" locomotive, a type that derived its name from its dome-shaped polished copper fire-box. The model was built by Mr. G. Taylor, Glasgow, and is described on this page.

Underwater Tunnel Built on Dry Land

(Continued from page 277)

made to deal with water that may enter the open section of the tunnel at the Mobile end, or may leak through the hurricane gates provided at the Blakely Island portal. These gates have been installed to prevent damage when the waters of Mobile Bay are driven inland by storm winds. At times these raise the level to 11 ft. above normal high water, so that the waves roll over the side of Blakely Island where the tunnel portal is placed. Any water entering the tunnel will find its way to special sumps. These are large enough to take all the water that might get in during a period of three-quarters of an hour when the rainfall is at the heaviest rate yet known, and they are intended to prevent flooding in an emergency in which the pumping plant is temporarily out of action.

NOTE FOR STAMP COLLECTORS

In a previous issue the address of our advertiser G. W. Saunders, whose announcement is included among the stamp advertisements on page 294, was wrongly given. The correct address is 51, Draycott Avenue, Harrow, Middlesex, and applications from readers who wrote to the address first given and received no reply will receive special attention.

Model "Bury" Type Locomotive

The illustration on this page shows an interesting model locomotive which was sent to us for inspection by its owner and builder, Mr. G. Taylor of Glasgow.

The engine is a gauge 0 model of one of the famous "Coppernob" locomotives, so called because of the dome-shaped polished copper fire-box, which was a feature of all "Bury" engines. The prototype of this model was built at Manchester in 1861 and was numbered 14 in the list of the old Furness Railway, being employed in active service until 1901, retaining its "Haystack" fire-box and open footplate up to the last.

The model, which took some weeks to construct, reproduces very well the features of the actual engine and is finished in maroon with orange and black lining. A most interesting feature is the inclusion of dummy footplate fittings, including regulator, pressure gauge, water gauge and fire-box doors complete with opening lever. The reversing lever is also included. The boiler bands, splasher edges and hand-rails are of polished brass, as also are the letters on the tender. The engine wheels are mounted on a detachable steel frame, and with the exceptions already mentioned, the remainder is built of wood.

Owing to the low-pitched boiler it was found impracticable to fit the mechanism to the actual engine, it was therefore decided to house this in the tender. The motive power decided on was a Hornby No. 2 Special Mechanism, which still has the original Hornby Locomotive driving wheels fitted.

French Indo-China

(Continued from page 285)

would have to be spent before it could become a first-class naval base.

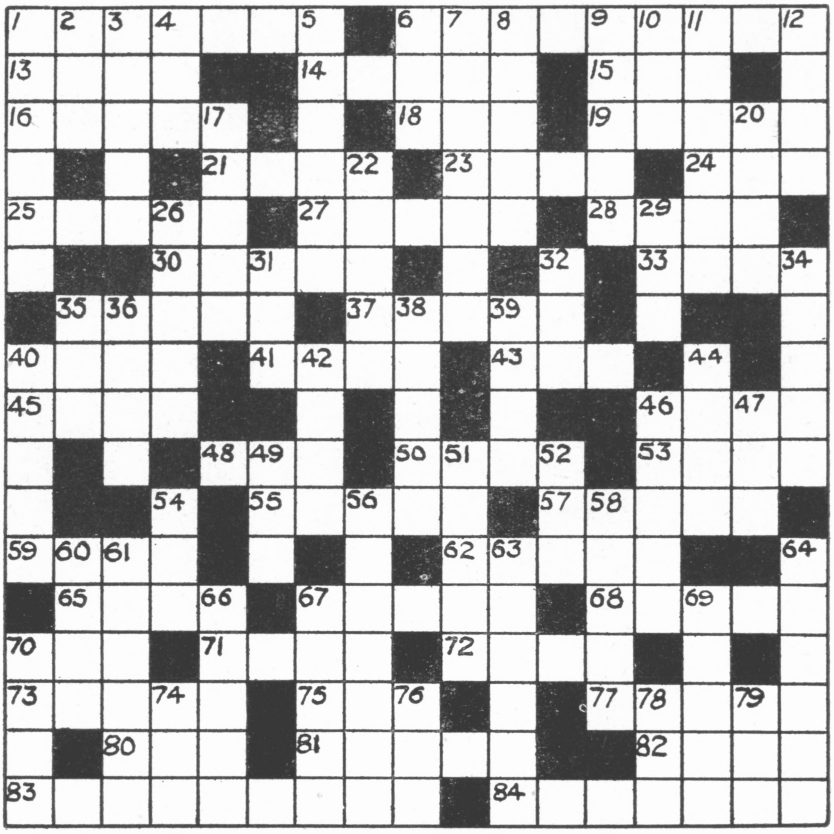
Off the coast of Tonkin is the famed Bay of Along. It is a calm blue sheet of water, dotted with thousands of precipitous and fantastically-formed islets and islands. You can cruise among them for hours, playing hide and seek among a myriad gray rock towers of a thousand fanciful forms, now and then peeping into their grottoes, once the haunt of pirates.

Hanoi, the capital of Tonkin, has many fine buildings and is more attractive than Saigon. It is the administrative head-quarters. In the middle of the city is a small lake with a little temple rising from the centre. In the native section of the city there are captivating streets devoted to dealers in silk, copper, carved woodenware and pearl-inlay objects. The mountains of Tonkin are rich in all kinds of minerals.

One has only to look down the list of exports to realise the potential wealth of this land. In addition to the immense quantity of rice she exports in a year, we have to add 500 tons of maize, 4,000 tons of pepper, 1,400 tons of tea and 50,000 tons of rubber. Cotton also is grown, as well as the sugar-cane, coffee, tobacco, ground nuts and other produce. The yearly export of minerals now totals over £2,000,000, and includes coal, tin, zinc and tungsten.

COMPETITIONS! OPEN TO ALL READERS

September Crossword Puzzle



CLUES ACROSS

1. A judge or umpire.
6. Ascending.
13. Haul.
14. Soil.
15. Used for propelling.
16. Loud sounds following each other.
18. Coin.
19. To be of one mind.
21. Correct.
23. Favourite animals.
24. Irritate.
25. Go in.
27. A camp.
28. Measures of Weight.
30. Raves.
33. Eras.
35. A figure of speech.
37. Tree or bush.
40. Supply of nourishment.
41. Story.
43. Make angry.
45. Ore vein.
46. Latin-American peasant.
48. Gardening implement.
50. Used for hearing.
53. Go ahead.
55. Coming afterwards.
57. Separate.
59. Virtuous.
62. Material.
65. Stuffs.
67. Famous British Admiral.
68. Girl's name.
70. Through.
71. Small nail.
72. Bird's home.
73. Empty.
75. Black liquid.
77. Mandarin's office.
80. To go.
81. Thick piece of timber shod with iron.
82. Small valley.
83. Part of the British Isles.
84. Pierced.

CLUES DOWN

1. Fruits.
2. Herb.
3. Blow up.
4. Unwell.
5. Consequence.
6. Civil Defence (initials).
7. Salary.
8. Perpendicular.
9. Cook in oven.
10. Silence.
11. Mistaken.
12. Journey by oxwagon.
17. Strip of leather.
20. Celtic language.
22. Used by artists.
26. Wear away.
29. Tree.
31. Without deduction.
32. Anger.
34. Give money for goods.
35. Also.
36. Travelled on horseback.
38. Earth retaining bank.
39. Always.
40. Throw.
42. Surface or enclosed space.
44. Equal.
46. Put in the ground.
47. Cereal seed.
49. Advanced in years.
51. Fire raising.
52. Rested.
54. Put together.
56. Drinking vessel.
58. Holiness.
60. Frank.
61. Collection of propelling implements.
63. Anoints with Oil.
64. Made smooth.
66. Metal.
67. Part of Greater London.
69. Pigeon.
70. Used for fastening things together.
74. Used for fishing.
76. Learned Society (initials).
78. Girl's name.
79. Once.

Crossword puzzles are among the most popular of those announced in the *"M.M.,"* and in view of their appeal we are giving another this month. As usual, competitors will find that the clues are all straightforward, and every word used can be found in standard dictionaries.

Prizes of 21/–, 10/6 and 5/– respectively will be awarded in order of merit to the three correct solutions that are neatest or most novel in presentation. There will be prizes of the same value in the Overseas section, and in each section there will be consolation prizes.

Entries should be addressed *"September Crossword Puzzle,* Meccano Magazine, Binns Road, Liverpool 13," and must reach this office not later than 30th September. The Overseas closing date is 31st January 1942.

Competitors must remember to write their names and addresses on their entry.

Another Railway Questions Contest

For our railway contest this month we have a series of questions on railway matters, constituting one of the now popular "Quiz" features. The questions are straightforward, and will be found extremely interesting to all railway enthusiasts, who will discover among them attractive puzzles and teasers.

The questions are as follows:

1. **What is the type name given to the 4-8-0 wheel arrangement?**
2. **Which was the first British streamlined train? Which company introduced it?**
3. **What is a "calling-on" signal?**
4. **Which railways in this country have built "Decapod" locomotives?**
5. **What is a "match truck"?**
6. **Which railway in the United States operates the "Abraham Lincoln" train?**
7. **What are "catch points" and where are they used?**
8. **What is it that indicates to a signalman whether a train is complete or not?**
9. **What do the initials "T.P.O." stand for?**
10. **What is an "insulated" van?**
11. **What is the "dead man's handle" and what does it do?**
12. **Some coaches have a pressure gauge on the solebar; what is this for?**

Every reader of the Magazine will be able to make a good attempt to answer these questions, and even if there is a doubt about any of the replies the entry should be sent in, as there will be a large number of prizes. Every reader of the *"M.M.,"* whether he is a member of the H.R.C. or not, can submit an entry. There will be prizes of 21/–, 10/6 and 5/– respectively for the three most meritorious efforts, and in addition there will be consolation prizes for entries that approach prize-winning standard. Similar awards will be made in the Overseas section.

The address to which the efforts of competitors should be sent is *"September Questions Contest,* Meccano Magazine, Binns Road, Liverpool 13." Entries in the Home section should reach this office not later than 30th September and those in the Overseas section by 31st January 1942. Every entry must have the competitors' full name and address on it.

Our September Photographic Contest

This month we announce another photographic competition in which prizes are offered for the best photographs submitted. There are two conditions—1, that the photographs must have been taken by the competitor; and 2, that on the back of each print must be stated exactly what the photograph represents. A fancy title may be added if desired. We remind readers that they must not photograph any features of military importance.

Entries will be divided into two sections, A for readers aged 16 and over, B for those under 16, and prizes of 21/– and 10/6 will be awarded in each section for the best entries, together with consolation prizes for other good efforts.

Entries in this month's competition should be addressed *"September Photo Contest,* Meccano Magazine, Binns Road, Liverpool 13," and must reach this office not later than 30th September. There will be separate sections, with prizes of the same values, open to Overseas readers, whose entries must arrive not later than 31st January 1942.

FIRESIDE FUN

IL DUCE

Teacher: "Now, Jimmy, I want you to use the word 'miscellaneous' correctly in a sentence."

Jimmy: "Franklin D. Roosevelt is the head man in the United States and miscellaneous the head man in Italy."

* * * *

The Boss: "Now, James, we've forgotten to get some stamps!"

Office Boy: "There, sir! Aren't we a couple of thickheads?"

* * * *

Son: "How would you define a picnic, dad?"

Facetious Father: "A picnic is a day set apart to get better acquainted with ants, mosquitoes, and poison ivy."

* * * *

Johnny, finding life a bore,
Drank some H_2SO_4.
Johnny's father, an M.D.,
Gave him $CaCO_3$.
Now he's neutralised it's true,
But he's full of CO_2.

* * * *

An American business man who had become quite a big figure in the film world was recently selecting a chief for his scenario staff, and insisted that the successful applicant must be a University graduate. Eventually he decided on a likely man for the post, and asked if he had had a University education. He received the affirmative reply.

"Show me your diploma," demanded the producer.

The applicant explained that it was not usual for graduates to carry diplomas around with them.

The producer thought for a minute. "Well, then," he demanded, "say me a big word."

* * * *

A little girl on returning from church was asked by her parents the text. "Don't worry, the muffler will come," she replied. This puzzled her parents very much and finally they asked the Vicar what his text had been and he told them:

"Fear not, the Comforter is at hand."

* * * *

"That new man Charlie is certainly a live wire," said the manager of a wayside garage.

"Really?"

"Yes, a motorist drove up just now and shouted: 'Dionne quintuplets'!"

"That was a puzzler, wasn't it?"

"Not to Charlie. He simply said, 'Yes, sir,' and gave him five gals!"

* * * *

Golfer: "Hi, caddie! Isn't Major Pepper out of that bunker yet? How many strokes has he had?"

Caddie: "Seventeen ordinary, sir, and one apoplectic!"

* * * *

Customer (to butcher): "Those sausages you sent me had meat at one end and bread at the other."

Butcher: "Yes, ma'am; in these hard times it's difficult to make both ends meat."

* * * *

Absent-minded Professor (giving lecture on biology): "I will now show you the internal construction of the frog." (Opens paper parcel containing two ham sandwiches). "Dear me, I'm sure I ate my lunch a few moments ago . . . . ."

* * * *

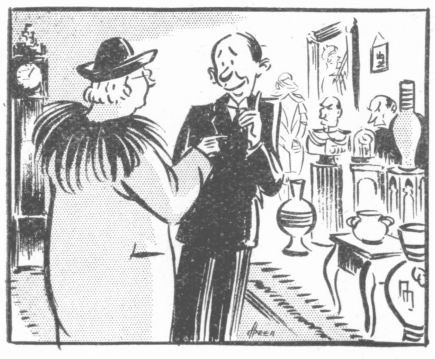
The self-made man who had just joined the club was having several of the more important members of the institution pointed out by a friend.

"You see that tall fellow with the monocle standing over by the fireplace?" whispered the old member. "Well, that's De Mountford, of the Guards . . . . . Know him?"

"No, I'm afraid not," replied the newly-joined clubman. "You see, I hardly ever use the railway nowadays."

* * * *

PRICELESS



Short-sighted lady, in antique dealer's: "What is the price of that horrible-looking gargoyle over there? I suppose it is worth a great deal?"

Assistant: "A very great deal, indeed, madam. That is the proprietor."

IN THE NEGATIVE

"There ain't nobody living on none of these here islands that can't tell me nothing I don't know about none of them."

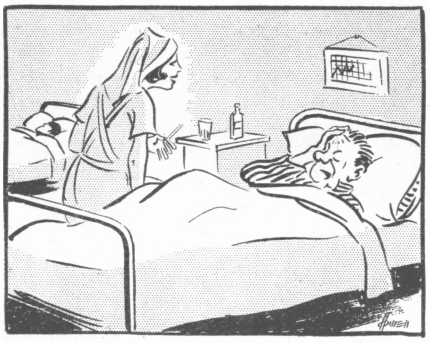
* * * *

Foreman: "Say, Murphy, what's wrong? Your mate is putting two shovelfuls of clay into the cart to your one."

Murphy: "Sure an' I don't know. He was doing it all day yesterday as well."

* * * *

NOTHING TO WORRY ABOUT



Patient: "I seem to have had a nasty blow on the head during the operation."

Nurse: "Oh, that's all right; we run a little short of chloroform, that's all."

* * * *

"Hello, where have you been?"

"Just got back from a camping trip."

"Roughing it, eh?"

"I'll say so. Why, one day our portable dynamo failed us, and we had no hot water, heat, electric light, ice, or radio for almost two hours!"

* * * *

Mother: "Marilyn, were you a good little girl at church to-day?"

Marilyn: "Yes, mother. A man offered me a big plate of money, and I said, 'No, thank you'."

* * * *

HELP!

Mary had a little lamp,
She filled it with benzine;
She went to light her little lamp,
And hasn't since benzine.

* * * *

Explorer (to cannibal): "Tell me, how did you first become a cannibal, Mr. Chief?"

Cannibal: "Well, I began as a little boy by biting my finger nails!"

* * * *

Uncle: "So you finished bottom of the class at spelling to-day?"

Nephew: "Yes, I put too many z's in 'scissors'."

* * * *

Jim: "I hear your wife has smashed up your car."

Ted: "Yes. I told her to let go the clutch."

Jim: "Well, and what did she do?"

Ted: "She let go the steering wheel!"

* * * *

The tramp entered the doctor's office. There was a worried look on his face.

"Doctor," he said, "you've got to help me. I swallowed a threepenny bit 25 years ago."

"Good heavens, man!" ejaculated the doctor. "Why didn't you go to a doctor the day you swallowed it?"

"To tell the truth," replied the tramp, "I didn't need the money at the time!"

* * * *

THIS MONTH'S HOWLER

"Habeas Corpus" was a phrase of the Great Plague and means "Bring out your dead."

WE KNOW

We editors may dig and toil,
Till our fingertips are sore;
But some poor fish is sure to say,
"I've heard that joke before."

* * * *

Q: What is the centre of gravity?
A: The letter V.

* * * *

Sergeant: "What's the first thing to do before cleaning your rifle?"

Recruit: "Have a look at the number."

Sergeant: "Have a look at the number? What for?"

Recruit: "To make sure you're not cleaning another bloke's rifle."

* * * *

Employer: "What did you mean by telling me you had had seven years' experience in a bank when you never had a job before?"

Youth: "Well, you advertised for a man with imagination."

* * * *

The office boy was going on his first holiday. His master called him in and asked, "Where are you going, Johnny?"

"Well I have not decided yet," replied Johnny.

"If I were you I'd go to Wigan and sit on the pier. You will get the fresh air," said the boss. When Johnny returned the master asked him if he went to Wigan.

"No, sir, I went to Sheffield. Uncle keeps the lighthouse there."

* * * *

Farmer Brown noticed that one of his men was wearing a new suit. "You want to take care of that, George," he said. "Put a hanger in the shoulders of the jacket."

Meeting the man a few days later he inquired whether his advice had been taken.

"Well, sir" said the man, "I tried fitting the 'anger in as 'e said, but every time I bent down the hook pushed me 'at off."

* * * *

"Alf," said the plumber's wife, "bring me a pound of steak when you come back for whatever you're going to forget this morning."

* * * *

"Now, boys," said the teacher, "here's your last problem to-day. See if any of you can get it right. Suppose I have a piece of beef-steak, and I cut it into 16 parts. What would you call those pieces?"

"Sixteenths!" piped a dozen voices.

"Right!" exclaimed the teacher. "And suppose each of these pieces were cut again into four pieces, what would they be?"

Silence reigned while the small brains worked desperately. Suddenly a hand was held up, and one of the pupils cried: "Hash!"

* * * *

Caddie Master (to new caddie): "All right, caddie, hop to it and grab that bag. Don't just sit around and look dumb, like you was a member of the club."

* * * *

NOT HER FAULT

Fair Driver on Continental holiday: "Don't get the car in the picture or people will think I ran into the place."

★ IT'S EASY TO BUILD THRILLING WORKING MODELS

WITH MECCANO

Every boy can build Meccano models—and make them work, just like the real thing. Meccano parts are real interchangeable engineering parts in miniature. They build a never-ending succession of superb models—bridges, clocks, cranes, towers, aeroplanes, locomotives, machine tools—in fact, everything that interests boys.

You can't start Meccano too soon

Prices subject to alteration without notice

This is a fine working model of an Elevated Jib Crane built with Outfit No. 4.

MECCANO LIMITED
BINNS ROAD
LIVERPOOL 13

The thrill of Meccano model-building never ends—there is always something new to make and something new to invent

Ask your dealer for prices or write direct to Meccano Ltd. Binns Road, Liverpool 13, for a copy of the latest price list

Realism in Home Railways

HORNBY TRAINS

There is nothing to touch Hornby models for realism and thrills. You can start a Hornby Railway with a passenger locomotive, a few coaches and a guard's van. Later you can add a goods train and then put on a crack passenger service with a model of a famous express. To make the realism more complete you can keep adding Hornby signals, stations, engine sheds, level crossings, turntables and many other wonderful accessories that are included in the Hornby system—the most perfect miniature railway system in the world.

GAUGE 'O'

Ask your dealer for prices or write to Meccano Ltd., Binns Road, Liverpool 13, for the latest price list.

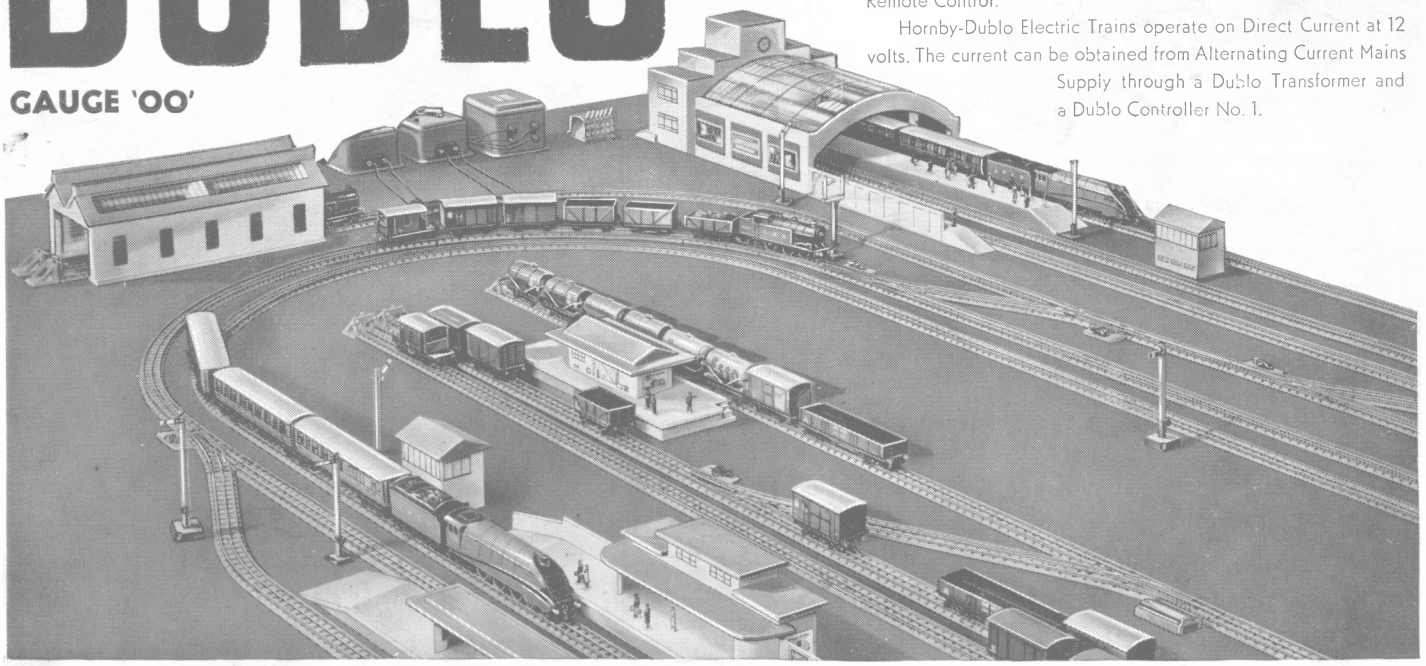
HORNBY DUBLO

GAUGE 'OO'

THE PERFECT TABLE RAILWAY

The Hornby-Dublo Railway System Gauge 00, provides a perfect home railway. With these wonderful small scale models a complete model railway can be planned on a dining table. Ideal where space is limited. Available in Clockwork or Electric. Built to scale. Realistic detail. Simple and safe. Automatic couplings. Remote Control.

Hornby-Dublo Electric Trains operate on Direct Current at 12 volts. The current can be obtained from Alternating Current Mains Supply through a Dublo Transformer and a Dublo Controller No. 1.



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